



# Hazardous Air Pollutant Emissions from the Manufacture of Amino and Phenolic Resins

## Basis and Purpose Document for Proposed Standards



NE SHAAP

Hazardous Air Pollutant Emissions  
From the Manufacture  
Of Amino and  
Phenolic Resins

Basis and Purpose Document  
for Proposed Standards

Emission Standards Division

U.S. Environmental Protection Agency  
Office of Air And Radiation  
Office of Air Quality Planning and Standards  
Research Triangle Park, North Carolina 27711

May 1998

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ENVIRONMENTAL PROTECTION AGENCY

Manufacture of Amino/Phenolic Resins --  
Basis and Purpose Document for Proposed Standards

1. The standards regulate organic hazardous air pollutant (HAP) emissions from the manufacture of amino and phenolic resins. Only those resin process units that are part of major sources under section 112(d) of the Clean Air Act (Act) will be regulated.

2. For additional information contact:

Mr. John Schaefer  
Organic Chemicals Group  
U.S. environmental Protection Agency (MD-13)  
Research Triangle Park, NC 27711  
Telephone: (919) 541-0296  
E-MAIL: SCHAEFER.JOHN@EPAMAIL.EPA.GOV

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## 1.0 PURPOSE OF DOCUMENT

The draft Basis and Purpose Document provides background information on, and rationale for, decisions by the Environmental Protection Agency (EPA) related to the proposed standards for the reduction of hazardous air pollutants (HAP) emitted through the manufacture of amino/phenolic resins. This document is intended to supplement the preamble for the proposed standards.

This document is separated into eight chapters providing a combination of background information and EPA rationale for decisions made in the standards development process. Chapters 2, 3, 5, and 7 provide background information; chapter 2 is an introduction, chapter 3 describes the affected industry, chapter 5 presents the baseline HAP emissions, and chapter 7 presents the predicted impacts associated with the regulatory alternatives. Chapters 4, 6, and 8 provide the EPA's rationale for the selection of the source category, the determination of MACT "floors" and development of regulatory alternatives beyond the MACT Floor, and a summary of the proposed standards, respectively.

Supporting information and more detailed descriptions for technical and rationale chapters are contained in the memorandum referenced in this document and contained in the project docket.

## 2.0 INTRODUCTION

Section 112 of the Clean Air Act (CAA), as amended in 1990 (1990 Amendments) provides the EPA with the authority to establish national standards to reduce air emissions from sources that emit one or more of 188 hazardous air pollutants (HAP). Section 112(b) of the Clean Air Act contains a list of HAP to be regulated by National Emission Standards for Hazardous Air Pollutants (NESHAP), and Section 112(c) directs the EPA to use this pollutant list to develop and publish a list of source categories for which NESHAP will be developed. The EPA must list all known source categories and subcategories of "major sources" that emit one or more of the listed HAP. A major source is defined in Section 112(a) as any stationary source or group of stationary sources located within a contiguous area and under common control that emits, or has the potential to emit considering controls, in the aggregate, 10 tons per year of any one HAP or 25 tons per year of any combination of HAP. This list of source categories was published in the Federal Register on July 16, 1992 (57 FR 31576).

The published list of source categories included the amino resins production source category and the phenolic resins production source category. These two products can broadly be classified as formaldehyde-based thermosetting resins. Because of similarities in the production process, HAP emissions, emission profiles, and applicable control technology, the

proposed regulation combines the amino and phenolic resins production categories into a single source category called amino/phenolic resins production.

Table 3-1. AMINO/PHENOLIC RESIN PRODUCTION FACILITIES

3.0 DESCRIPTION OF THE AFFECTED INDUSTRY

This chapter presents a brief description of the industry affected by this rule. This chapter is divided into five separate sections: Section 3.1 provides a basic description of the amino/phenolic resins industry, Section 3.2 describes of the amino resins production process, Section 3.3 describes the phenolic resins production process, Section 3.4 describes emission points for the amino/phenolic resins production processes, and Section 3.5 lists references for this chapter.

3.1 GENERAL

The EPA has identified a total of 99 plant sites producing either amino or phenolic resins. The majority of these facilities are either area sources or synthetic area sources.<sup>1</sup>

Table 3-1 identifies the known producers of amino/phenolic resins, along with their facility locations. The amino/phenolic resin manufacturing facilities covered in the scope of this NESHAP are located in 30 states. The largest number of facilities are located in Oregon, followed by: North Carolina, Alabama, Ohio, Texas, Illinois, and South Carolina.

Amino resins are produced by reacting formaldehyde ( $\text{CH}_2\text{O}$ ) with an amino compound [a compound with an amino group ( $\text{NH}_2$ )].

Company	Location
3M	Cottage Grove, MN
3M	Hartford City, IN

Table 3-1. AMINO/PHENOLIC RESIN PRODUCTION FACILITIES

Company	Location
3M	North Cordova, IL
Akzo	Louisville, KY
AMETEK	Wilmington, DE
Ashland	Calumet City, IL
Ashland	Cleveland, OH
Auralax	Norwich, CT
BASF	Greenville, OH
Bendix	Green Island, NJ
Borden	Alexandria, LA
Borden	Demopolis, AL
Borden	Diboll, TX
Borden	Fayetteville, NC
Borden	Forest Park, OH
Borden	Fremont, CA
Borden	Island City, OR
Borden	Louisville, KY
Borden	Missoula, MT
Borden	Morganton, NC
Borden	Mt. Jewett, PA
Borden	North Kent, WA
Borden	Sheboygan, WI
Borden	Springfield, OR
BTL	Toledo, OH
Capital Resins	Columbus, OH
Cargill	Carpentersville, IL
CNC International	Woonsocket, RI
Cook Composites	Houston, TX
Cytec	Kalamazoo, MI
Cytec	Mobile, AL
Cytec (A.C. Molding)	Wallingford, CT
Cytec (Negron)	Wallingford, CT
Delta Resins	Detroit, MI
Delta Resins	Milwaukee, WI
Dexter	Birmingham, AL
Dexter	Waukegan, IL

Table 3-1. AMINO/PHENOLIC RESIN PRODUCTION FACILITIES

Company	Location
Dock Resins	Linden, NJ
Dynachem	Georgetown, IL
Exxon Chemical	Houston, TX
Freedom Textile	Charlotte, NC
Georgia-Pacific	Albany, OR
Georgia-Pacific	Columbus, OH
Georgia-Pacific	Conway, NC
Georgia-Pacific	Crossett, AR
Georgia-Pacific	Elk Grove, CA
Georgia-Pacific	Eugene, OR
Georgia-Pacific	Grayling, MI
Georgia-Pacific	Louisville, MS
Georgia-Pacific	Lufkin, TX
Georgia-Pacific	Peachtree City, GA
Georgia-Pacific	Port Wentworth, GA
Georgia-Pacific	Russellville, SC
Georgia-Pacific	Taylorsville, MS
Georgia-Pacific	Ukiah, CA
Georgia-Pacific	Vienna, GA
Georgia-Pacific	Virginia, MN
Georgia-Pacific	White City, OR
Heresite Protective Coatings	Manitowoc, WI
Hickson	Danville, VA
Hoechst Celanese	Mount Holly, NC
Insulating Materials	Schenectady, NY
International Paper	Hampton, SC
IVAX Industries	Rock Hill, SC
Lawter International	Moundville, AL
National Starch	Salisbury, NC
Neste	Andalusia, AL
Neste	Moncure, NC
Neste	North Winnfield, LA
Neste	Spokane, WA
Neste	Springfield, OR
Neste	Toledo, OH



Table 3-1. AMINO/PHENOLIC RESIN PRODUCTION FACILITIES

Company	Location
NM Adhesives	Las Vegas, NM
Occidental	Niagara Falls, NY
Occidental	North Tonawanda, NY
Occidental	South Kenton, OH
Perstorp	Florence, MA
Pioneer	Florence, ME
Plastics Engineering	Sheboygan, WI
PMC Specialties	Fords, NJ
P.D. George	St. Louis, MO
Ranbar	Manor, PA
Reichold	Newark, NJ
Rhone-Polenc	Louisville, KY
Schenectady	Rotterdam Junction, NY
Schenectady	Schenectady, NY
Sequa	Chester, SC
Simpson Timber	Portland, OR
Solutia	Addyston, OH
Solutia	Springfield, MA
Southeastern Adhesives	Lenoir, NC
Southeastern Adhesives	Ridgeway, VA
Spaulding Composites	Dekalb, IL
Spurlock Adhesives	East Waverly, VA
Stuart-Ironsides, Inc.	Chicago, IL
Sun Coast	Dallas, TX
Sybron Chemicals	Birmingham, NJ
Synthron, Inc.	Morganton, NC
Valentine Sugars	Lockport, LA

In general, amino resins use urea ( $\text{NH}_2\text{CONH}_2$ ), a urea derivative, or melamine ( $\text{C}_3\text{N}_3(\text{NH}_2)_3$ ) to form methylol monomer units, which are subsequently condensed to form a polymer.

Amino resin means a resin produced through the reaction of formaldehyde, or a formaldehyde containing solution (e.g., aqueous formaldehyde), with compound(s) that contain the amino group; these compounds include melamine, urea, and urea derivatives.

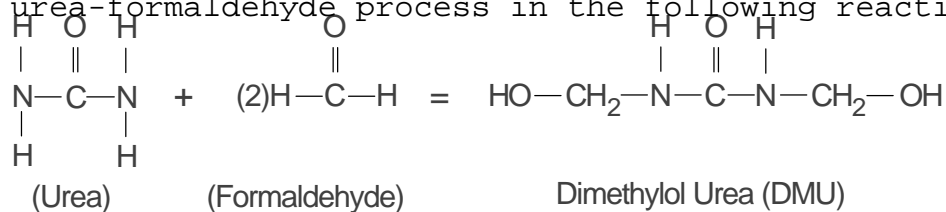
Phenolic resins are formed by reacting phenol ( $\text{C}_6\text{H}_5\text{OH}$ ) with formaldehyde.

Phenolic resin means a resin that is a condensation product of formaldehyde and phenol, or a formaldehyde substitute and/or a phenol substitute. Substitutes for formaldehyde include acetaldehyde or furfuraldehyde. Substitutes for phenol include other phenolic starting compounds such as cresol, xylenols, p-tert-butylphenol, p-phenylphenol, and nonylphenol.

Both phenolic and amino resins are produced in processes that are very similar to one another. Jacketed steel or stainless steel reaction vessels equipped with an agitator and a condenser are generally used.

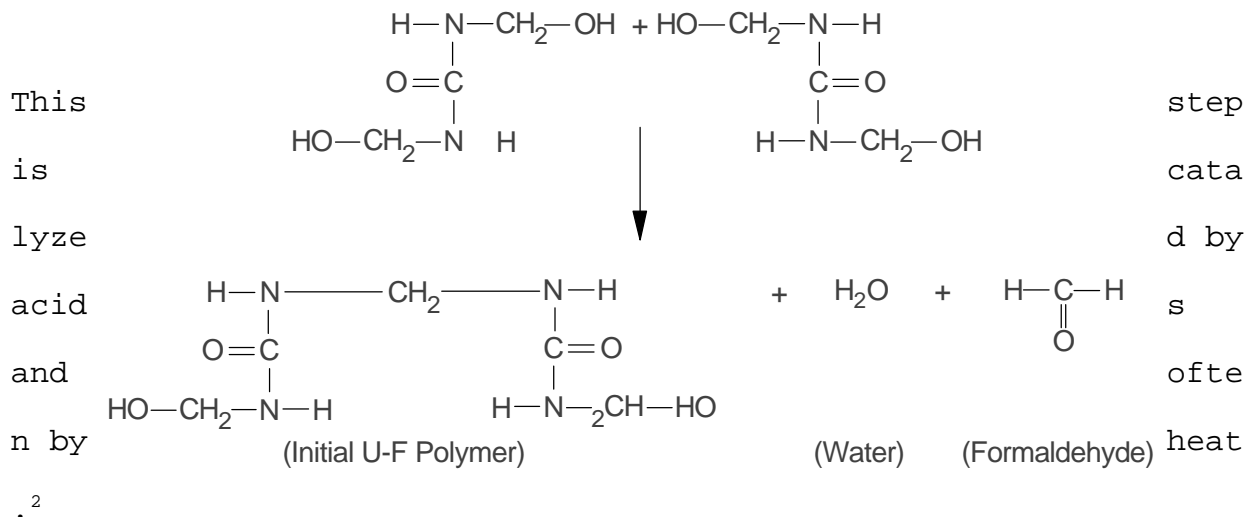
### 3.2 AMINO RESINS PRODUCTION

The overall reaction for amino resins formation is similar to that for phenol-formaldehyde resol formation.<sup>2</sup> The first step is the addition of formaldehyde to the amino compound and is known as methylation or hydroxymethylation. This step is shown for the urea-formaldehyde process in the following reaction:



This step is usually catalyzed by a base compound since the compounds are more stable under alkaline conditions.<sup>2</sup>

The second step is known as condensation, methylene bridge formation, polymerization, or simply cure. During condensation, water is removed from the monomer units. Amino units are then joined with the methylene links. The reaction process for the urea-formaldehyde process is as follows:



The processes that produce urea or melamine formaldehyde resins are very similar. Often the same equipment is used to produce both melamine and urea formaldehyde resins. This section will discuss a general amino resins process production process.

Amino resins are manufactured in a simple batch process. The initial product is a concentrated syrup which is then sold or further processed into solids. Figure 3-1 is a schematic representation of the batch process.

Aqueous formaldehyde solution (usually 37% or 50%) is drawn from storage and fed to a resin reactor (typically 2,000 to 10,000 gallons). Amino compounds, catalysts, and additives are added and mixed.<sup>8</sup> An additive used in large quantities for melamine resins is methanol, which helps stabilize the compound.<sup>2</sup> The reactor is agitated continuously and the mixture is heated to the desired temperature by steam in the reactor jacket. The progress of the reaction is measured periodically by sampling for viscosity. When the desired viscosity has been reached, the batch is cooled in the reactor and the syrup is concentrated by evaporation of water with a vacuum. The pH is adjusted and the syrup is pumped through a filter and into a syrup storage tank.

The syrup is then stored for sale, concentrated further, or processed into a powder. Solid powder is produced in a two-step process and can consist of either an unfilled powder which is manufactured by spray drying, or a filled powder in which a solid

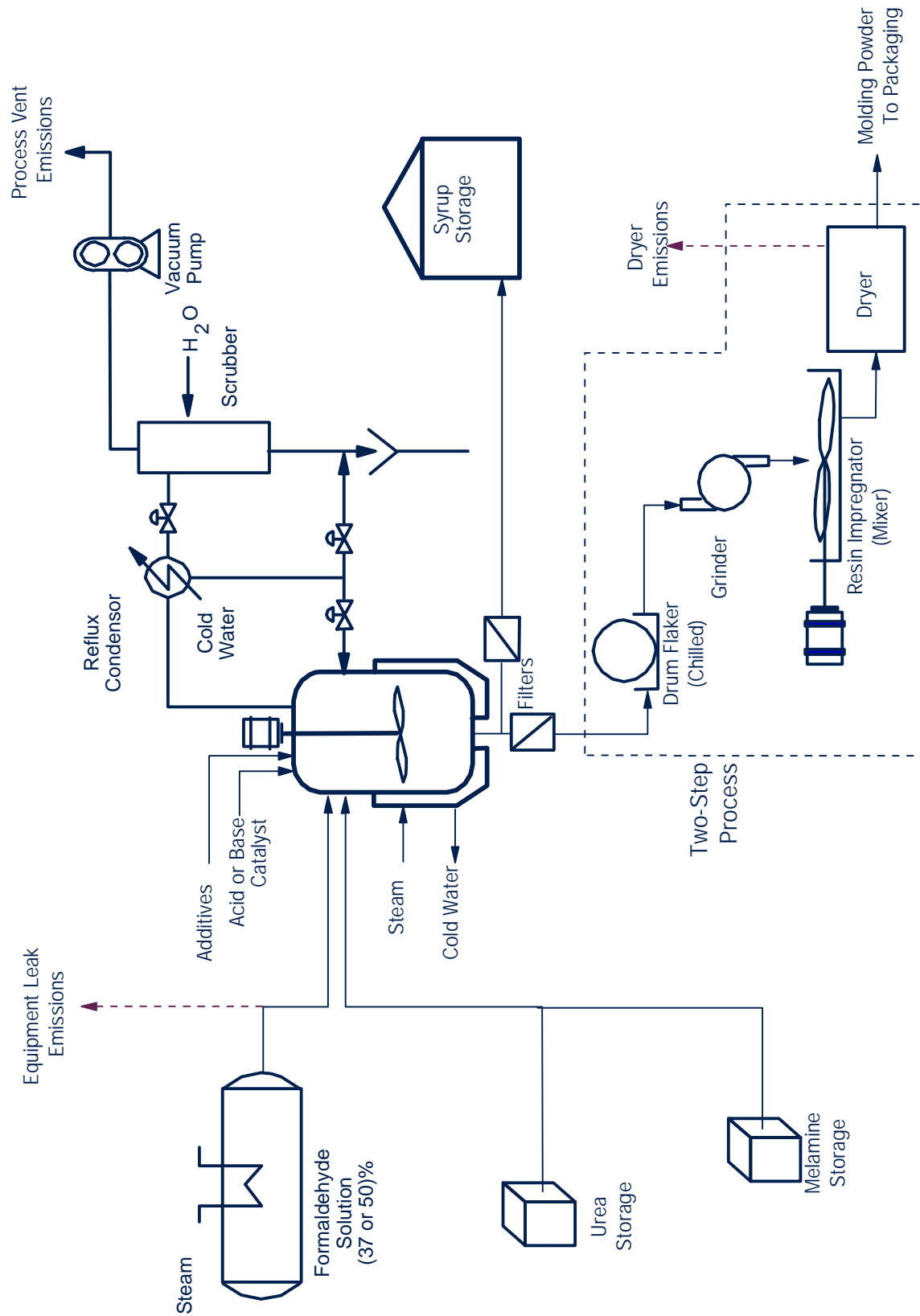


FIGURE 3-1. AMINO RESINS MANUFACTURING PROCESS

is saturated with syrup. The powder is then dried and pulverized. The powder can be sold as a powder or it can be deaerated into granules.<sup>7</sup>

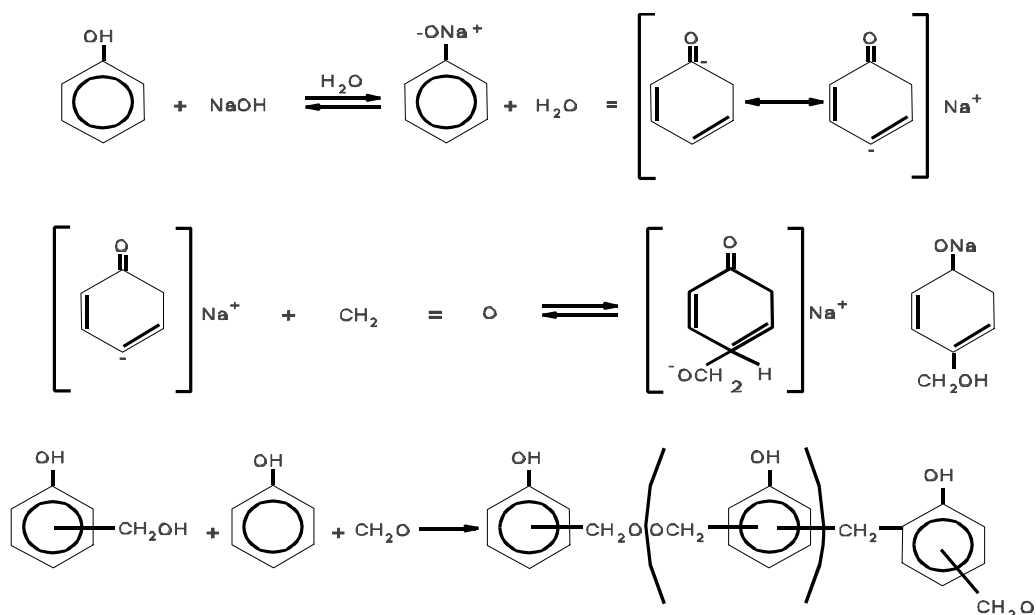
### 3.3 PHENOLIC RESINS PRODUCTION

Phenolic resins are condensation products of formaldehyde and phenol.<sup>2,3,4</sup> Besides formaldehyde, acetaldehyde or furfuraldehyde is sometimes used but in much smaller quantities. In addition to phenol, other phenolic starting compounds include alkyl-substituted phenols, such as cresols, xylenols, p-tert-butylphenol, p-phenylphenol, and nonylphenol.<sup>3</sup>

Resols and novolaks are two types of phenolic resins produced.<sup>2,3,4</sup> Resols are produced in a one-step process either as an aqueous syrup (liquid resole) or as a varnish (solid resole dissolved in an alcohol or organic solvent). Novolaks are produced in a two-step process to form molding powders.<sup>2</sup>

#### 3.3.1 Resols Process Description

In the production of resole resins, a mole ratio of 1 to 3, formaldehyde to phenol respectively, is generally used with a basic catalyst such as sodium, barium, calcium hydroxide, sodium carbonate, or an organic amine.<sup>3,4</sup> The conventional mechanism of polymerization is shown in the following reactions:



Depending on the extent of the polymerization and the functionality, which is the total number of unsubstituted positions on the benzene ring that are specific to the application, intended for the material, the materials can be high in molecular weight and viscosity.

Resols resin production is conducted in a batch process reactor. Figure 3-2 shows a diagram for a typical batch process for resols and novolaks.<sup>2</sup> The process for resols will produce either liquid or solid resols. Liquid resols (aqueous syrup) can be produced in large capacity reactors because their viscosities can be controlled and they do not have to be discharged as rapidly as solid resols.

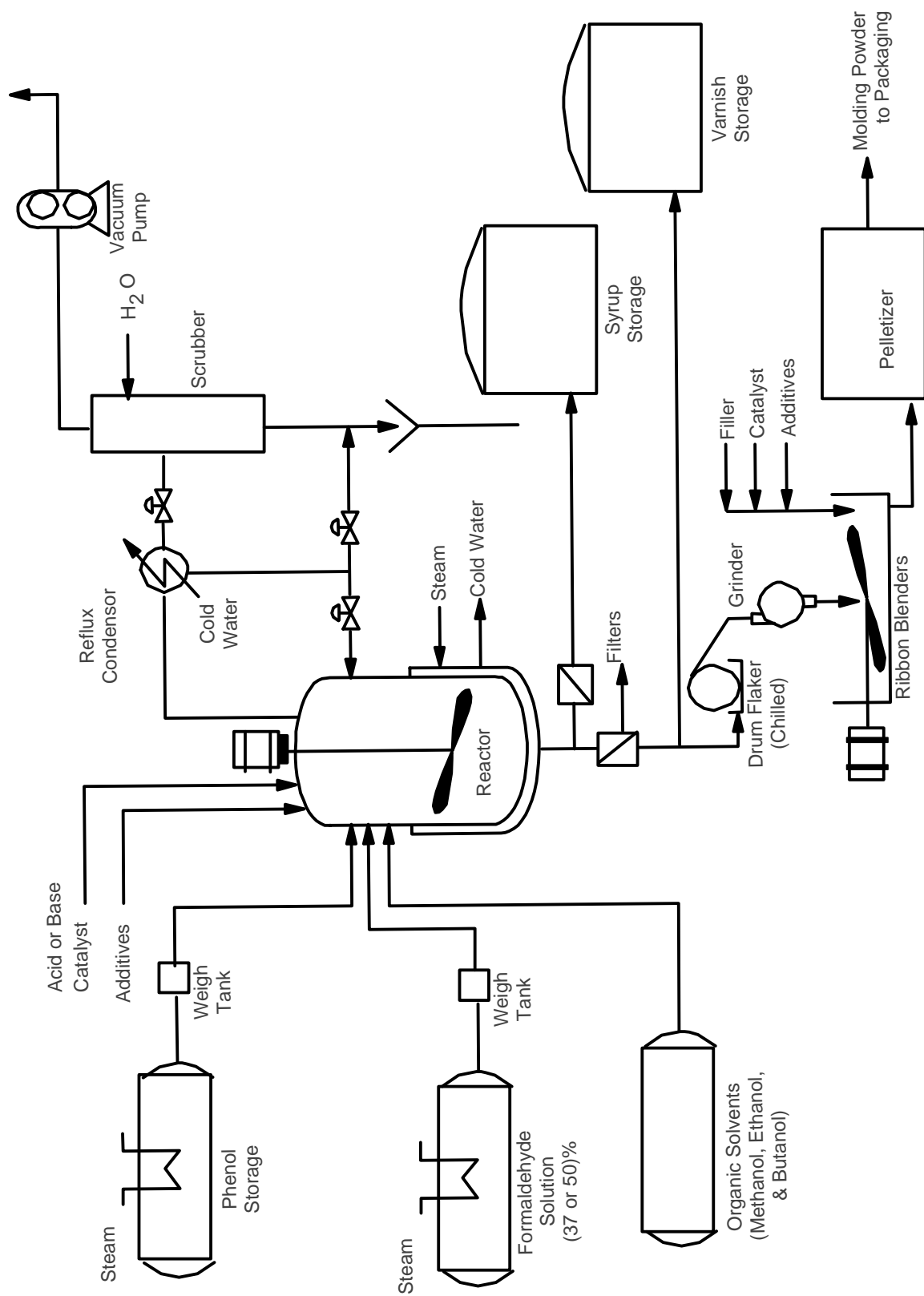


FIGURE 3-2. PHENOLIC RESINS MANUFACTURING PROCESS



Solid resols generally require a relatively small reactor (10 cubic meters) to maintain thermal stability and to allow rapid discharge since near the end of the reaction the viscosity increases rapidly. An agitator is used to prevent local gelation and to provide power to circulate the viscous fluids.<sup>3</sup> A batch cycle normally takes eight hours.

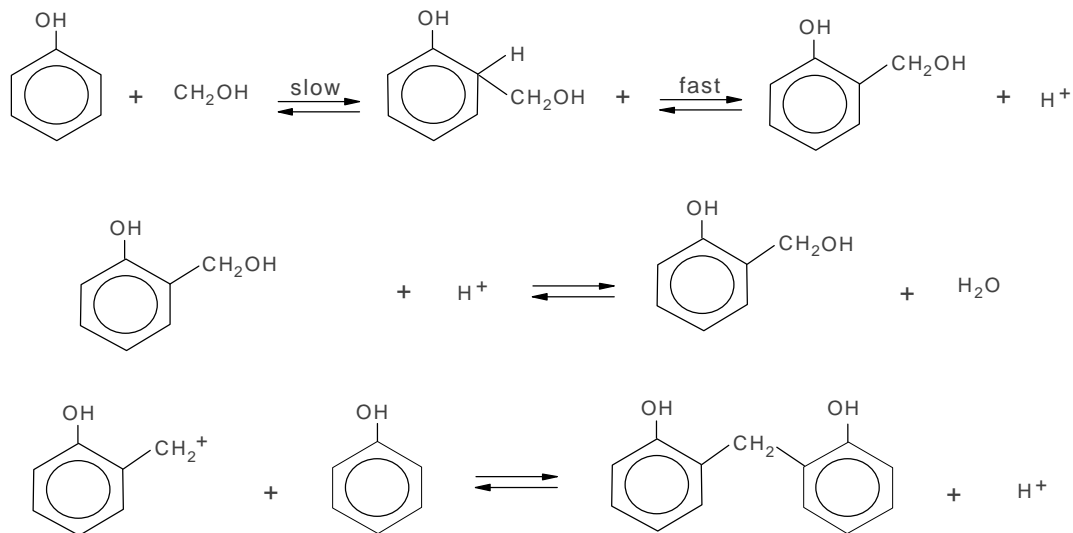
Raw materials in the production of resoles are molten phenol, formaldehyde (37 or 50 percent aqueous solution), and an organic solvent. Molten phenol which is fed through a weigh tank and the desired basic catalyst, such as sodium hydroxide, are charged first to the reactor. Next the 37% or 50% aqueous formaldehyde is fed through a weigh tank and added to the reactor at a rate to maintain a temperature of 60 to 70°C (140 to 158°F). The desired reaction temperature, approximately 80 to 100°C (176 to 212°F), is achieved by heating the mixture in a reaction vessel that has an internal coil or external, temperature-controlled jacket. In addition, agitation and a vacuum reflux are used to maintain the desired temperature. The temperature is maintained for 1 to 3 hours. The reaction is monitored at short intervals by measuring the viscosity of a sample from the reactor. When the desired end point is reached, the reaction mixture is neutralized with an acid such as acetic, formic, sulfuric, or phosphoric acid. Evaporation of the water (distillation) is performed in the reactor under a vacuum until the desired syrup concentration is achieved. The reaction

contents are then cooled as rapidly as possible by discharging them to cooled engineered surfaces, such as air-cooled floors, moving belts, or trays in racks. The aqueous syrup is then filtered and stored, usually in a refrigerator for future use.

After the distillation step is completed, a solvent, such as methanol, is added to the solid resole and the product is recovered as a varnish solution. The varnish solution is then stored for future use. In either liquid or solid resoles, additives and modifiers may be introduced during different steps of the process.

### 3.3.2 Novolaks Production

In the production of novolak resins, a mole ratio of formaldehyde to phenol is normally between 0.70 and 0.85.<sup>3,4</sup> Oxalic acid is normally the catalyst used in the process; however, acid catalysts such as hydrochloric acid, sulfuric acid, sulfonic acid, p-toluene and phosphoric acid are sometimes used.<sup>3</sup> When an acid catalyst is used, phenol and formaldehyde react by way of electrophilic substitution. The general mechanism for polymerization is given in the following reactions.<sup>3,4</sup>



For the batch process of novolak resin production, a two-step process is generally used. Figure 3-2 shows a diagram for a typical batch process.<sup>2,3,4</sup>

Phenol, which is stored in alloyed steel tanks at approximately  $60^\circ\text{C}$  ( $140^\circ\text{F}$ ), is weighed and transferred to the reactor where it is heated to  $95^\circ\text{C}$  ( $203^\circ\text{F}$ ). The acidic catalyst, which is usually oxalic acid, is then added to the reactor. After the acidic catalyst has been added, an aqueous formaldehyde solution is stirred into the reactor. The solution is stirred at a rate designed to maintain a gentle boiling of the mixture. The temperature of the mixture is maintained until the reaction has exhausted the supply of formaldehyde. Water and unreacted phenol are removed from the reaction mixture by heating an external heating jacket to approximately  $132^\circ$  ( $270^\circ\text{F}$ ) at atmospheric pressure. The reaction mixture is heated further to  $160^\circ\text{C}$

(320°F). By using a vacuum and injecting live steam into the reaction mixture, the residual volatiles are removed from the resin. When the desired melting point is achieved, the resin is fed to a heated vessel. It is then flaked onto a continuous cooling belt. To form a powder resin, the flake is fed to a grinder. In some cases, the powder resin is blended with additives in a ribbon blender and then sent to a pelletizer for further processing.

### 3.4 EMISSIONS

The potential emission points for amino/phenolic resins are the same. Potential emission points include the following: reactor batch process vents, non-reactor batch process vents, continuous process vents, equipment leaks, wastewater, and storage vessels.

#### 3.4.1 Reactor Batch Process Vent Emissions

The manufacture of amino/phenolic resins takes place in a single batch reactor. Emissions associated with the batch reactor include charging, cooking or reflux, and distillation. The primary HAP emitted from batch reactor process vents are formaldehyde, methanol, and phenol. These HAP can potentially be emitted during each of the above events.

During the initial charging phase of a typical batch, a highly exothermic reaction takes place which produces the highest emissions. During the cooking phase, the reactor is operated in reflux with vapors being condensed and returned to the reactor.

Very few emissions occur during this phase. Finally, emissions can occur during the distillation phase when a vacuum is pulled on the reactor and excess water is evaporated from the product.

#### 3.4.2 Non-reactor Batch Process Vent Emissions

Potential emissions can also occur from a variety of equipment located at the facility including, but is not limited to, mix tanks, flakers, and filters. The primary HAP emitted from batch non-reactor process vents are formaldehyde, methanol, phenol, and xylene.

#### 3.4.3 Continuous Process Vent Emissions

Potential emissions can occur from spray drying operations. Spray drying operations include belt dryers, continuous drum dryers, and continuous screen dryers that are vented to the atmosphere.<sup>8</sup>

#### 3.4.4 Equipment Leak Emissions

Equipment leak emissions occur while valves, pumps, flanges, and other equipment are in HAP service. The amount of emissions emitted from these components depend on the number of leaking components, the type of service (i.e., gas/vapor, light liquid, or heavy liquid), the percent of HAP contained in the process fluid contacting the components, and the amount of time the components remains in contact with the process fluid. The type of HAP emitted depends on the process fluid in contact with the component. Typical HAP emitted are formaldehyde, phenol, methanol, and other chemicals that are charged to the reactor.

HAP emissions occur from these components only when they are in contact with the process fluid and there is a leak. Facilities may flush their process lines so that some of the components are no longer in contact with process fluids. During those periods of time, there would be no potential emissions from the components.

#### 3.4.5 Wastewater Emissions

HAP emissions from wastewater can occur when the resin is distilled to remove excess water and during reactor cleaning. In addition, wastewater can result from the use of scrubbers; several facilities use scrubbers as control devices. The primary HAP emitted from wastewater at amino/phenolic resin facilities are formaldehyde and methanol.

#### 3.4.6 Storage Vessel Emissions

HAP emissions from storage vessels occur when material is added to the storage vessel (loading emissions), which displaces HAP-containing air from the vessel. Emissions from storage vessels also occur as the result of breathing (or standing) losses, which are emissions from the tank that occur when there is no displacement of vapor (i.e., no filling or emptying of the storage vessel). The amount of HAP emissions that occur from storage vessels depends on the type of organic liquid in the storage vessel, the type of storage vessel (e.g., fixed roof tank, floating roof tank), the methods used to fill and empty the tank, and the number of turnovers per year. The primary HAP

emitted from storage vessels at amino/phenolic resin facilities are formaldehyde, methanol, phenol, toluene, and xylene.

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#### 4.0 SELECTION OF SOURCE CATEGORY

The amino resins production and phenolic resins production source categories are listed in the source category list published on July 16, 1992 (57 FR 3156). As noted in Chapter 2, these two source categories are being combined into a single source category for the purposes of this rulemaking. This action is being taken due to similarities in process operations, emissions characteristics, and control device applicability.

As described in detail in Chapter 3, the amino resins manufacturing process and the phenolic resins manufacturing process are very similar. At many facilities, the same process equipment is used to produce both amino and phenolic resins. For such facilities, complying with two different sets of standards would be difficult, if not impossible. In addition, the emission points for facilities manufacturing amino and phenolic resins are the same (reactor and non-reactor process vents, dryer vents, storage vessels, wastewater, and equipment leaks) and the resulting emission characteristics are very similar. Lastly, amino and phenolic manufacturing facilities use the same types of control devices to control HAP emissions from corresponding emission points; that is, there are no significant differences in the types of control technologies applicable to controlling emissions from amino and phenolic resins manufacturing processes.

Common HAP control technologies are applicable to all production operations at all of the facilities.

Another consideration in treating amino and phenolic resin facilities under a single set of standards is the cost involved in developing the standards and in complying with the standards. For the EPA, it is more efficient and less costly to develop a single standard than to develop separate standards for multiple source categories that have similar emission characteristics and applicable control technologies. A single set of standards will ensure that process equipment with comparable HAP emissions and control technologies are subject to consistent emission control requirements. In addition, compliance and enforcement activities would be more efficient and less costly.

In summary, the information obtained during the information gathering phase of the project demonstrated that the manufacturing processes, emission characteristics, and applicable control technologies for facilities in these two source categories are similar. Based on these factors, the EPA concluded that these two source categories are to be treated as a single source category for purposes of this rulemaking. For purposes of the proposed rule, the term amino/phenolic resin, and similar terms, will be used to indicate that the two source categories of amino resins and phenolic resins have been treated as a single source category for purposes of developing this rule.

As shown in Table 3-1, a total of 99 facilities were

identified as being in the amino/phenolic resin source category. Information gathered during the development of the proposed rule indicated that many of these facilities are area sources or synthetic area sources. Of the identified facilities, 40 are considered major sources (see "Major source population of amino and phenolic resin facilities for purposes of MACT analysis," Docket Item II-B-10, for the procedures used to determine major sources<sup>1</sup>). The proposed rule applies only to major sources.

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<sup>1</sup> In this memorandum, 44 major sources are identified. After the original data were collected, several facilities have closed or have been otherwise identified as not being in the source category. Thus, the total number of sources identified as "major" is estimated to be 40.

## 5.0 BASELINE EMISSIONS

Baseline organic HAP emissions for the six emission points for the Amino/Phenolic Resins Industry are presented in Table 5-1. As shown in the table, the total nationwide estimated organic HAP emissions are over 644 megagrams per year (Mg/yr) for the 40 major existing sources.

Table 5-1. BASELINE ORGANIC HAP EMISSIONS BY EMISSION POINT FOR MAJOR EXISTING SOURCES

Emission Point	Emissions (Mg/yr)
Reactor Batch Process Vents	202.4
Non-reactor Batch Process Vents	109.0
Continuous Process Vents	116.4
Storage Vessels	65.4
Wastewater	6.1
Equipment Leaks	144.6
Total	643.9

The organic HAP emitted include formaldehyde, methanol, phenol, xylene, and toluene. The quantity of emissions for each individual organic HAP was not determined; however, formaldehyde, methanol, and phenol are estimated to comprise the largest quantity of emissions. The predominant organic HAP emitted by each emission point are identified in Table 5-2.

TABLE 5-2. PREDOMINANT HAP EMITTED BY EMISSION POINT

Emission Point	HAP Emitted
Reactor Batch Process Vents	formaldehyde, methanol, phenol
Non-reactor Batch Process Vents	formaldehyde, methanol, phenol, xylene
Continuous Process Vents	formaldehyde, methanol
Storage Vessels	formaldehyde, phenol, methanol, toluene, xylene
Wastewater	formaldehyde, methanol
Equipment Leaks	formaldehyde, methanol, phenol

As described in Chapter 3, organic HAP are emitted from reactor batch process vents, non-reactor batch process vents, continuous process vents, storage vessels, wastewater, and equipment leaks. Reactor batch process vents comprise the largest portion of these emissions (over 31%), followed by equipment leaks, continuous process vents, and non-reactor batch process vents.

Emission estimates were made for each of the 40 major sources in active operation. Emissions for reactor batch process vents, non-reactor batch process vents, continuous process vents, storage vessels, and wastewater were based on information submitted by each facility. For most of these emission points, the emissions reported by the facility were used. However, for some of the facilities, emissions had to be estimated. For example, for a number of facilities, reactor and non-reactor batch process vents emissions were estimated using an average

emission factor, which was derived from information provided by the other facilities, and the production capacity reported by the facility.

In some instances, the emissions provided for wastewater was not used because it contained emissions from sewers, which were not considered part of wastewater under the proposed rule.

For equipment leaks, baseline emissions were estimated using equipment component counts, type of service (i.e., gas/vapor, light liquid, heavy liquid), the percent HAP in contact with the component, the time in HAP service, and uncontrolled or controlled emission factors, as appropriate, for each component type and service. Many facilities provided equipment component counts. For those facilities that did not provide specific component counts, equipment component counts were estimated using information on the number and type (i.e., light liquid or heavy liquid) of storage vessels and component count factors (e.g., number of valves in light liquid service per light liquid storage vessel). Type of service was based on the facility's identification of whether or not the component was in gas/vapor, light liquid, or heavy liquid service. Where this information was not available, the type of service was based on the compounds being used. For example, unless otherwise indicated, the composition of formalin was assumed to be 37% formaldehyde and 7% methanol component, which is a common formulation for formalin. This assumption makes formalin a heavy liquid.

If facilities did not provide specific information on the percent HAP in contact with the components or the time in contact, then default values of 100% HAP (except for formalin) and 8,760 hours per year were used to estimate emissions. For formalin, the default value was 44% HAP (37% formaldehyde and 7% methanol).

The uncontrolled emission factors were largely based on "Protocol for Equipment Leak Emission Estimates," EPA-453/R-93-026, June 1993. Controlled emission factors were used to reflect the application of a leak detection and repair program based on 40 CFR part 60, subpart VV.

The specific calculation made to estimate baseline emissions for the six emission points can be found in the following memoranda:

- Batch Process Vents Analysis for Amino/Phenolic Resins NESHAP, Docket Item II-B-12.
- Continuous Process Vents Analysis for Amino/Phenolic Resins NESHAP, Docket Item II-B-15.
- Storage Vessels Analysis for Amino/Phenolic Resins NESHAP, Docket Item II-B-13.
- Wastewater Analysis for Amino/Phenolic Resins NESHAP, Docket Item II-B-14.
- Equipment Leak Analysis for Amino/Phenolic Resins NESHAP, Docket Item II-B-11.

## 6.0 MACT FLOORS AND REGULATORY ALTERNATIVES

This chapter presents the approach used to determine maximum achievable control technology (MACT) floors and regulatory alternatives beyond the MACT floor for the amino/phenolic resin production source category. The 1990 Clean Air Act (Act) requirements for the determination of MACT floors are discussed in 6.1. The general approach used to determine the MACT floors and regulatory alternatives beyond the MACT floor for the amino/phenolic resin source category is discussed in 6.2. The MACT floors, regulatory alternatives beyond the MACT floor, and selected standards are presented by emission point in 6.3 through 6.10.

### 6.1 CLEAN AIR ACT REQUIREMENTS

The Clean Air Act as amended in 1990 requires EPA to promulgate emission standards to reflect the maximum degree of reduction in emissions of HAP that EPA determines is achievable for new or existing sources. This control level is referred to as MACT. The Act also states how to determine the least stringent level allowed for a MACT standard; this level has come to be known as the "MACT floor." Consideration of control levels more stringent than the MACT floor must reflect consideration of the cost of achieving the emission reduction, and any non-air quality, health, and environmental impacts, and energy requirements.



For new sources, the standards for a source category or subcategory "shall not be less stringent than the emission control that is achieved in practice by the best controlled similar source, as determined by the Administrator" [section 112(d)(3)]. Existing source standards must be no less stringent than the average emission limitation achieved by the best performing 12 percent of the existing sources (for which EPA has emissions information) for source categories and subcategories with 30 or more sources or the average emission limitation achieved by the best performing 5 sources (for which EPA has emissions information) for source categories or subcategories with fewer than 30 sources [section 112(d)(3) of the Act]. These two minimum levels of control define the MACT floor for new and existing sources.

Two interpretations were previously evaluated by the EPA for representing the MACT floor for existing sources. One interpretation is that the MACT floor is represented by the worst performing facility of the best 12 percent of performing sources. The second interpretation is that the MACT floor is represented by the "average emission limitation achieved" by the best performing sources, where the "average" is based on a measure of central tendency, such as the arithmetic mean, median, or mode. This latter interpretation is referred to as the "higher floor interpretation." In a June 6, 1994 Federal Register notice (59 FR 29196), the EPA presented its interpretation of the statutory

language concerning the MACT floor for existing sources. Based on a review of the statute, legislative history, and public comments, the EPA believes that the "higher floor interpretation" is a better reading of the statutory language. The determination of the MACT floor for existing sources under the proposed rule followed the "higher floor interpretation."

## 6.2 GENERAL APPROACH FOR MACT FLOORS AND REGULATORY ALTERNATIVES BEYOND THE MACT FLOOR

There are 40 facilities that are major sources in the amino/phenolic resins production source category. MACT floors were determined separately for each emission point. For existing sources, the Clean Air Act requires the MACT floor to be set by the average of the best performing 12 percent of existing sources; 5 sources ( $40 \text{ sources} \times 0.12 = 5 \text{ sources}$ ) represent the best performing 12 percent. Therefore, a separate MACT floor was determined for each emission point and the "best performing" 5 sources for each emission point could be different. For new sources, the MACT floor is set by the best controlled existing source. The best controlled source may differ for each emission point. For both existing and new sources, regulatory alternatives beyond the MACT Floor were investigated. Regulatory alternatives beyond the MACT floor were incorporated into the proposal as appropriate after consideration of cost and any non-air quality, health, and environmental impacts, and energy requirements. Table 6-1 provides the new and existing MACT

floors, regulatory alternatives beyond the MACT floor considered, and selected standards for each of the following emission points: storage vessels, continuous process vents, reactor batch process vents, non-reactor batch process vents, heat exchange systems, wastewater, and equipment leaks.

Table 6-1. MACT FLOOR AND REGULATORY ALTERNATIVES BEYOND THE MACT FLOOR  
ANALYSIS FOR EXISTING AND NEW AFFECTED SOURCES

Emission Point	MACT Floor		Regulatory Alternatives Considered		Selected Standard	
	Existing	New	Existing	New	Existing	New
Storage Vessels	<p>Aqueous formaldehyde vessels <math>\geq 10,000</math> gallons capacity with vapor pressure <math>\geq 0.47</math> psia;</p> <p>Non-aqueous formaldehyde vessels <math>\geq 10,160</math> gallons capacity with vapor pressure <math>\geq 2.45</math> psia; and <math>\geq 90,000</math> gallons capacity with vapor pressure <math>\geq 0.45</math> psia;</p> <p>Control level of 50%</p>	<p>Aqueous formaldehyde vessels <math>\geq 10,000</math> gallons capacity with vapor pressure <math>\geq 0.47</math> psia;</p> <p>Control level of 50%</p> <p>Non-aqueous formaldehyde vessels <math>\geq 10,160</math> gallons capacity with vapor pressure <math>\geq 2.45</math> psia; and <math>\geq 90,000</math> gallons capacity with vapor pressure <math>\geq 0.45</math> psia;</p> <p>Control level of 95%</p>	None	None	<p>Aqueous formaldehyde vessels <math>\geq 10,000</math> gallons capacity with vapor pressure <math>\geq 0.47</math> psia;</p> <p>Non-aqueous formaldehyde vessels <math>\geq 10,160</math> gallons capacity with vapor pressure <math>\geq 2.45</math> psia; and <math>\geq 90,000</math> gallons capacity with vapor pressure <math>\geq 0.45</math> psia;</p> <p>Control level of 50%</p>	<p>Aqueous formaldehyde vessels <math>\geq 10,000</math> gallons capacity with vapor pressure <math>\geq 0.47</math> psia;</p> <p>Control level of 50%</p> <p>Non-aqueous formaldehyde vessels <math>\geq 10,160</math> gallons capacity with vapor pressure <math>\geq 2.45</math> psia; and <math>\geq 90,000</math> gallons capacity with vapor pressure <math>\geq 0.45</math> psia;</p> <p>Control level of 95%</p>
Continuous Process Vents	No control	85% emission reduction	HON	HON	No control	85% control for some vents and the HON provisions for other vents

Table 6-1. MACT FLOOR AND REGULATORY ALTERNATIVES BEYOND THE MACT FLOOR  
ANALYSIS FOR EXISTING AND NEW AFFECTED SOURCES

Emission Point	MACT Floor		Regulatory Alternatives Considered		Selected Standard	
	Existing	New	Existing	New	Existing	New
Reactor Batch Process Vents	93% emission reduction with an alternative emission limit of 0.017 kilogram of HAP per megagram of product	95% emission reduction with an alternative emission limit of 0.01 kilogram of HAP per megagram of product	95% emission reduction based on combustion	None considered	93% emission reduction with an alternative emission limit of 0.017 kilogram of HAP per megagram of product	95% emission reduction with an alternative emission limit of 0.01 kilogram of HAP per megagram of product
Non-Reactor Batch Process Vents	reduce overall emissions by 68% for affected sources with uncontrolled emissions from the collection of non-reactor batch process vents greater than or equal to 0.23 Mg/yr	reduce overall emissions by 83% for affected sources with uncontrolled emissions from the collection of non-reactor batch process vents greater than or equal to 0.23 Mg/yr	95% emission reduction based on combustion .	95% emission reduction based on combustion .	reduce overall emissions by 68% for affected sources with uncontrolled emissions from the collection of non-reactor batch process vents greater than or equal to 0.23 Mg/yr	reduce overall emissions by 83% for affected sources with uncontrolled emissions from the collection of non-reactor batch process vents greater than or equal to 0.23 Mg/yr
Heat exchange systems	monitor for leaks	monitor for leaks	HON	HON	monitor for leaks according to the HON provisions	monitor for leaks according to the HON provisions
Wastewater	No control	No control	HON	HON	No control	HON

Table 6-1. MACT FLOOR AND REGULATORY ALTERNATIVES BEYOND THE MACT FLOOR  
ANALYSIS FOR EXISTING AND NEW AFFECTED SOURCES

Emission Point	MACT Floor		Regulatory Alternatives Considered		Selected Standard	
	Existing	New	Existing	New	Existing	New
Equipment Leaks	No control	LDAR program at Solutia's Springfield, MA facility (SOCMI VV)	(1) SOCMI VV (2) HON LDAR	(1)HON LDAR	HON LDAR	HON LDAR

### 6.3 DETERMINATION OF MACT FLOORS FOR STORAGE VESSELS

This section describes the approach taken for determining the MACT floor for storage vessels at existing and new affected sources. Table 6-2 presents the storage vessel data for those facilities that had applied controls to any of their storage vessels (i.e., the MACT floor facilities). The entire analysis is limited to this data set. Applicability criteria and control levels for the MACT floor were developed using the same approach used for the development of the HON.

#### 6.3.1 MACT Floors for Storage Vessels at Existing Sources

The MACT floor for existing sources is set by the average performance for the best performing 12 percent of existing sources for categories with 30 or more sources. In this proposed rule, the category contains 40 facilities that are major sources. Therefore, the best performing 12 percent of existing sources is represented by the best performing 5 facilities. The best performing 5 facilities were selected based on the same approach as used in developing the MACT floor for storage vessels under the HON. Applicability criteria and control levels for the MACT floor were also developed using the HON approach. Note that there are only 4 facilities that control storage vessels at baseline. The fifth facility of the best performing 5 could be

Table 6-2. AMINO/PHENOLIC RESIN STORAGE VESSELS RAW MATERIAL TANKS  
FROM BEST PERFORMING 5 FACILITIES

No. Tanks	Company	Location	Chemical	Vapor Pressure (psia)	Size (gal)	Control	Control Device Efficiency Perce	Emissions	
								Uncont. Mg/vr	Cont. Mg/vr
5 tks	Borden	Fayetteville, NC	aqueous formaldehyde	0.47	55,000	Scrubber	50%	912	456
15 tks	Borden	Fayetteville, NC	aqueous formaldehyde	0.47	16,000	Scrubber	50%	812	406
2 tks	Borden	Fayetteville, NC	phenol	<0.01	25,000	None	0%	260	260
1 tk	Borden	Fayetteville, NC	methanol distillate	1.63	30,000	None	0%	73	73
1 tk	Borden	Fayetteville, NC	methanol distillate	1.63	20,000	None	0%	49	49
1 tk	Borden	Fayetteville, NC	aqueous formaldehyde	0.47	10,000	Scrubber	50%	33	16
8 tks	Borden	Louisville, KY	aqueous formaldehyde	0.47	20,000	Scrubber	50%	704	352
2 tks	Borden	Louisville, KY	distillate	1.63	20,300	None	0%	695	695
3 tks	Borden	Louisville, KY	phenol	<0.01	20,300	None	0%	500	500
1 tk	Borden	Louisville, KY	ethylene glycol	<0.01	20,000	None	0%	1	1
1 tk	Borden	Louisville, KY	toluene	0.71	4,500	None	0%	1	1
1 tk	Cytec	Wallingford, CT	methanol distillate	1.63	20,000	None	0%	2981	2981
1 tk	Cytec	Wallingford, CT	methanol distillate	1.63	11,600	None	0%	2865	2865
1 tk	Cytec	Wallingford, CT	methanol distillate	1.63	15,000	None	0%	2865	2865
1 tk	Cytec	Wallingford, CT	methanol	2.45	50,000	Scrubber	95%	946	47
1 tk	Cytec	Wallingford, CT	methanol	2.45	50,000	Scrubber	95%	946	47
1 tk	Cytec	Wallingford, CT	methanol wash	2.45	10,159	Scrubber	95%	625	31



Table 6-2. AMINO/PHENOLIC RESIN STORAGE VESSELS RAW MATERIAL TANKS  
FROM BEST PERFORMING 5 FACILITIES

No. Tanks	Company	Location	Chemical	Vapor Pressure (psia)	Size (gal)	Control	Control Device Efficiency Perce	Emissions	
								Uncont. Mg/yr	Cont. Mg/yr
1 tk	Cytec	Wallingford, CT	recovered methanol	2.45	10,000	None	0%	600	600
1 tk	Cytec	Wallingford, CT	methyl formcel	0.45	90,000	Scrubber	95%	452	23
1 tk	Cytec	Wallingford, CT	methanol wash	2.45	10,159	Scrubber	95%	222	11
1 tk	Cytec	Wallingford, CT	xylene	<1.5	15,000	None	0%	70	70
1 tk	Cytec	Wallingford, CT	aqueous formaldehyde	0.15	90,000	Scrubber	95%	32	2
1 tk	Simpson Timber	Portland, OR	aqueous formaldehyde	0.47	47,972	Scrubber	85%	1420	213
1 tk	Simpson Timber	Portland, OR	methanol	1.93	80,926	None	0%	280	280
1 tk	Simpson Timber	Portland, OR	phenol	<0.01	51,702	None	0%	160	160

Note: The capacity values (size in gallons) apply separately to each storage vessel, while the uncontrolled and controlled emissions (lb/yr) apply collectively to the group of storage vessels for that specific facility.

any one of the other uncontrolled facilities; the term "best performing 5" is used even though there are only four facilities that control storage vessels at baseline.

For existing sources, the HON approach determines whether or not there is control at the MACT floor by considering the overall control status of each facility independently, judging each facility as controlled or uncontrolled based on a predominance of controlled or uncontrolled storage vessels. For example, if 8 out of 10 storage vessels are controlled at a given facility, the overall control status of that facility is "controlled." Next, the HON approach looks at a predominance of the best performing 5 facilities. If at least 3 out of the 5 facilities are considered "controlled," a MACT floor of control is considered to exist. Table 6-3 presents a summary of the number of uncontrolled and controlled storage vessels at each of the four facilities that controlled storage vessels at the baseline and presents the HON approach finding that the existing source MACT floor is "controlled."

Table 6-3. HON ANALYSIS OF RAW MATERIAL TANKS

Facility	Status - controlled out of total	Controlled or Uncontrolled <sup>a</sup>
Cytec, Wallingford, CT	6 out of 11	Controlled
Simpson Timber, Portland, OR	1 out of 3	Uncontrolled
Borden, Fayetteville, NC	21 out of 25	Controlled
Borden, Louisville, KY	8 out of 15	Controlled
Existing MACT Floor Facility Average	3 facilities out of 4 facilities	Controlled

<sup>a</sup> The facility level controlled/uncontrolled decision is based on whether or not a majority of tanks are controlled.

The HON approach expresses applicability criteria in terms of vapor pressure and vessel capacity cutoffs. Once a finding of "controlled" is made for the MACT floor, the first step in developing applicability criteria is to plot all the tanks in the best performing 5 population on a graph of vapor pressure versus capacity and identify them as controlled or uncontrolled. The second step is the development of vapor pressure and capacity cutoffs that would describe those tanks that are controlled and exclude tanks that are uncontrolled. More than one set of vapor pressure and storage vessel capacity cutoffs may be developed, as was the case for this analysis for the existing source MACT floor. The following applicability criteria were developed:

Aqueous formaldehyde	≥10,000 gallons capacity with vapor pressure ≥0.47 psia
Non-aqueous formaldehyde	≥10,160 gallons capacity with vapor pressure ≥2.45 psia; and ≥90,000 gallons capacity with vapor pressure ≥0.45 psia

Two sets of criteria were developed because the storage vessels in the best performing 5 facility data set naturally lend themselves to division based on the material stored (i.e., aqueous formaldehyde or other materials), and because the HON approach requires that storage vessels that are not controlled be excluded by the applicability criteria.

The control level for the MACT floor is established based on the control levels at the baseline. Of the best performing 5 facilities, there are a total of 36 controlled storage vessels of which 6 are controlled to 95 percent, 1 is controlled to 85 percent, and 29 are controlled to 50 percent. The median and mode, which is 50 percent, was chosen to represent the MACT floor control level.

#### 6.3.2 MACT Floors for Storage Vessels at New Sources

The MACT floor for new sources is set by the best controlled source. Using the HON approach for new sources, the best controlled source (here, the best controlled amino/phenolic resin facility) is identified based on the absolute number of storage vessels controlled.

The Borden, Fayetteville facility is the best controlled source based on absolute number of storage vessels controlled. However, the only controlled storage vessels are aqueous formaldehyde storage vessels and this leaves storage of other raw materials (i.e., non-aqueous formaldehyde) unaddressed. The Cytec, Wallingford facility is the next best controlled facility based on the absolute number of storage vessels controlled and includes other raw materials among the controlled vessels. The Borden, Fayetteville facility is the best controlled facility for aqueous formaldehyde storage vessels, and the Cytec, Wallingford facility is the best controlled facility for non-aqueous formaldehyde storage vessels. Therefore, separate floors were set for aqueous formaldehyde and non-aqueous formaldehyde storage vessels.

Like the process for existing sources, vapor pressure and capacity cutoffs were developed that include those storage vessels that are controlled at baseline and exclude storage vessels that are uncontrolled at baseline. The storage vessels at the Borden, Fayetteville facility were used to develop the aqueous formaldehyde criteria, and the storage vessels at the Cytec, Wallingford facility were used to develop the non-aqueous formaldehyde criteria. The following storage vessel applicability criteria were developed:

Aqueous formaldehyde	≥10,000 gallons capacity with vapor pressure ≥0.47 psia
Non-aqueous formaldehyde	≥10,160 gallons capacity with vapor pressure ≥2.45 psia; and ≥90,000 gallons capacity with vapor pressure ≥0.45 psia

The applicability criteria for existing and new sources are coincidentally the same because of the large number of storage vessels at the Borden, Fayetteville facility.

The control level for the new source MACT floor is established based on the control levels at the best controlled facility. For aqueous formaldehyde storage vessels, the best controlled facility is the Borden, Fayetteville facility. For non-aqueous formaldehyde storage vessels, the best controlled facility is the Cytec, Wallingford facility.

The aqueous formaldehyde storage vessels at the Borden, Fayetteville facility are all controlled to 50 percent. Therefore, the MACT floor for aqueous formaldehyde storage vessels is 50 percent. At the Cytec, Wallingford facility some non-aqueous formaldehyde storage vessels are controlled and some are not controlled. The applicability criteria presented above separate the controlled tanks from the uncontrolled tanks. All of the controlled tanks are controlled to 95 percent. Therefore, the MACT floor for non-aqueous formaldehyde storage vessels is 95 percent.

#### 6.4 DETERMINATION OF MACT FLOORS FOR CONTINUOUS PROCESS VENTS

This section describes the approach taken for determining the MACT floor for continuous process vents at existing and new sources.

The first step in determining the MACT floor for continuous process vents was to determine which major source facilities control their continuous process vents. Eight facilities thought to have continuous process vents that might have controls were contacted by telephone. Of these 8 facilities, continuous process vents at 3 facilities were discovered to be batch process vents, one facility had closed, and 4 facilities were confirmed to have continuous process vents. Of the 4 facilities with continuous process vents, 1 facility had 2 continuous process vents (dryers) that were each controlled with a scrubber with an 85 percent control efficiency. The three remaining facilities with continuous process vents did not control their process vents. Table 6-4 presents the data for these major source facilities included in the analysis.

##### 6.4.1 MACT Floors for Continuous Process Vents at Existing Sources

The MACT floor for existing sources is set by the average performance for the best performing 12 percent of existing sources for categories with 30 or more sources. The best performing 12 percent of existing sources is represented by the best performing 5 facilities for this source category. Because

only one facility was identified as controlling its continuous process vents, the MACT floor for existing sources is no control.

Table 6-4. CONTINUOUS PROCESS VENT CONTROLS AT MAJOR SOURCES

Facility	Location	Control Device
BTL	Toledo, OH	No Control
Cytec Industries	Wallingford, CT	Two Scrubbers - Each has 85 percent efficiency
Georgia Pacific	Crossett, AR	No Control
Perstorp	Florence, MA	No Control

#### 6.4.2 MACT Floors for Continuous Process Vents at New Sources

The MACT floor for new sources is set by the best controlled amino/phenolic resin production facility. The best controlled facility has a scrubber with an 85 percent control efficiency. The applicability criterion chosen to represent the specific continuous process vents that were controlled at the MACT floor is the HON total resource effectiveness (TRE) equation for a thermal incinerator with 70 percent heat recovery. This applicability criterion was selected because the HON process vent provisions were relied upon for part of the standard and using the same applicability criterion to define the MACT floor provides a consistent approach for the rule.

The expression of applicability criteria is limited to the TRE equation for a thermal incinerator with 70 percent heat recovery because there was only one set of vent stream data, which did not allow the EPA to evaluate a range of stream



conditions that were controlled versus those that were not controlled. This TRE value of 1.2 was calculated using the vent stream data for the continuous process vents setting the 85 percent MACT floor.

## 6.5 DETERMINATION OF MACT FLOORS FOR REACTOR BATCH PROCESS VENTS

This section describes the approach taken for determining the MACT floor for reactor batch process vents at existing and new sources.

### 6.5.1 MACT Floors for Reactor Batch Process Vents at Existing Sources

The MACT floor for reactor batch process vents at existing sources is set by the average performance for the best performing 12 percent of existing sources. The best performing 12 percent of existing sources is represented by the best performing 5 facilities. Each of the best performing 5 facilities had applied secondary controls to all of their reactor batch process vents; this fact necessitates that the proposed rule require control of all reactor batch process vents with no applicability criteria. Table 6-5 presents the data for the best performing 5 facilities in terms of reactor batch process vent controls.

The data set used for setting the MACT floor was limited to the 17 facilities for which the 1992 ICR responses indicated that secondary controls had been applied to reactor batch process vents. These facilities were contacted via telephone during 1997

and were asked a series of questions in order to clarify the data that were reported in the 1992 ICR responses. Some of the topics

Table 6-5. BEST PERFORMING 5 FACILITIES FOR REACTOR BATCH PROCESS VENTS  
 BASED ON APPLIED SECONDARY CONTROLS<sup>a</sup>

Facility	Type of Resin	Production of Methylated Resins (N or %)	Collocated with Formaldehyde Plant (Y/N)	Secondary Controls	Emission Factor (kilograms of HAP per megagram of production)
Ranbar	P	N	N	thermal incinerator (95%)	0.84
Georgia Pacific, Taylorsville, MS	A/P	N	Y	catalytic incinerator (95%)	0.01
Georgia Pacific, Port Wentworth, GA	A/P	5 - 10%	N	caustic treatment (93%)	0.017
Borden, Louisville, Ky	P	N	Y	scrubber (90%)	CBI
Solutia, Addyston, OH	A	100%	N	scrubber (85%)	CBI

<sup>a</sup> The data on this table is restricted to the 17 facilities that were contacted during the recent data gathering effort.

that were covered during the teleconferences included the presence and purpose of a primary condenser, emissions before and after the primary condenser, efficiency of the primary condenser and secondary control devices, whether the facility was collocated with a formaldehyde plant, and whether the facility produced methylated resins.

In considering the best performing 5 facilities based on applied secondary controls, the data were evaluated to determine if the collocation with formaldehyde plants or the production of methylated resins influenced the application of secondary controls, specifically the use of combustion devices. No patterns emerged. One combustion device is at a phenolic producer (Ranbar) that does not produce any methylated resins and is not collocated with a formaldehyde plant. The other combustion device is at an amino/phenolic producer (Georgia Pacific, Taylorsville) that does not produce any methylated resins and is collocated with a formaldehyde plant.

In addition, the data were evaluated for patterns of applied secondary controls versus the production capacity of facilities. Again, no patterns emerged. One combustion device is located at a 816 Mg/yr (1.8 million lb/yr) producer (Ranbar), and the other combustion device is located at a 69,851 Mg/yr (154 million lb/yr) producer (Georgia Pacific, Taylorsville). These production capacities are typical small and large facilities, respectively.

In conclusion, because of the good distribution of methylators and non-methylators, facilities collocated with formaldehyde plants and those not, and amino only, phenolic only, and amino/phenolic producers within the best performing 5 facilities, the best performing 5 facilities were considered representative of the industry.

The EPA considered two options for the MACT floor. The options considered included selecting the percent reduction for the median facility or averaging the percent reduction values for the best performing 5 facilities and determining the alternative emission limit in a similar manner. The option selected uses the median facility for establishing the percent reduction and the alternate emission limit. The Georgia Pacific, Port Wentworth facility represents the median facility of the best performing 5. Using the percent reduction value and the emission factor for this facility, the MACT floor was selected as 93 percent emission reduction with an alternative emission limit of 0.017 kilogram of HAP per megagram of product.

The option of averaging the percent reductions for the best performing 5 facilities was not selected because providing the corresponding alternate emissions limit would require averaging the emissions factors for the best performing 5 facilities. Because of the exceptionally high emission factor for Ranbar (0.84 kilogram of HAP per megagram of product), which is a facility with a combustion device expected to have a low

emissions factor, the EPA judged that this approach would not provide a reasonable alternative emissions limit.

#### 6.5.2 MACT Floors for Reactor Batch Process Vents at New Sources

The MACT floor for reactor batch process vents at new sources is set by the best controlled amino/phenolic resin facility. Referring back to Table 6-5, a review of the best performing facilities reveals two facilities with combustion controls. In selecting the best controlled facility, the Ranbar and Georgia Pacific, Taylorsville facilities were considered as equally controlled. Because the emission factor for the Ranbar facility is judged to be exceptionally high considering the reported secondary controls, the Georgia Pacific, Taylorsville facility was selected as the best controlled facility.

Therefore, the first option that was chosen as the MACT floor is 95 percent emission reduction with an alternative standard of 0.01 kilogram of HAP per megagram of product.

### 6.6 DETERMINATION OF MACT FLOORS FOR NON-REACTOR BATCH PROCESS VENTS

This section describes the approach taken for determining the MACT floor for non-reactor batch process vents at existing and new affected sources.

#### 6.6.1 MACT Floors for Non-Reactor Batch Process Vents at Existing Sources

The MACT floor for non-reactor batch process vents at existing sources is set by the average performance for the best

performing 12 percent of existing sources. The best performing 12 percent of existing sources is represented by the best performing 5 facilities. The best performing 5 facilities were selected based on the overall emission reduction achieved by each facility. All of the best performing 5 facilities had applied controls to some of their non-reactor batch process vents, and two of the best performing 5 facilities had applied controls to all of their non-reactor batch process vents. This baseline control situation, and the limited data set available for the analysis, led the EPA to consider a single option for the development of existing source MACT floor based on achieving a specified emission reduction for the collection of non-reactor batch process vents within the affected source. Table 6-6 presents the data for the best performing 5 facilities in terms of non-reactor batch process vent controls and the overall emission reduction achieved by each facility. The facility average emission reduction ranged from 83.7 percent to 50 percent.

Table 6-6. BEST PERFORMING 5 FACILITIES FOR NON-REACTOR BATCH PROCESS VENTS BASED ON OVERALL PERCENT REDUCTION

Company	Location	Emission Point	Emission Point Description	Uncont'd Emis. (tpv)	Cont'd Emis. (tpv)	Primary Control Device	Primary Device Eff. %	Second. Control Device	Second. Device Eff. %	Combined Eff. %
Schenectady	Rotterdam Junction, NY	E14	Weigh tank	0.247	0.247	None	NR	None		
Schenectady	Rotterdam Junction, NY	E5/E6	Separator Tank	24.1	0.241	Condenser	NR	Scrubber	NR	99.5
Schenectady	Rotterdam Junction, NY	E7	Hold Tank	25.2	0.252	Condenser	99	None	NR	NR
Schenectady	Rotterdam Junction, NY	E4	Holding Tank	12.1	12.1	None		None		
Schenectady	Rotterdam Junction, NY	E15/E16	Mix Tank Unit	7.31	0.3654	Condenser	NR	Scrubber	NR	95
Schenectady	Rotterdam Junction, NY	E20	Separator Unit	21.7	0.11	Condenser	NR	Scrubber		99.5
Schenectady	Rotterdam Junction, NY	E19	Hold Tank	6.76	0.879	Condenser	87	None		
Schenectady	Rotterdam Junction, NY	E21	Recycle System	0.182	0.182	None		None		
Schenectady	Rotterdam Junction, NY	E22/E23	Recycle Tank	2.31	0.0231	Condenser	99	None		
Schenectady	Rotterdam Junction, NY	E24	Flaking belt	5.67	2.84	Scrubber	NR	None		
Overall Emission Reduction for non-reactor batch process vents is 83.7 percent										



Table 6-6. BEST PERFORMING 5 FACILITIES FOR NON-REACTOR BATCH PROCESS VENTS BASED ON OVERALL PERCENT REDUCTION

Company	Location	Emission Point	Emission Point Description	Uncont'd Emis. (tpv)	Cont'd Emis. (tpv)	Primary Control Device	Primary Device Eff.%	Second. Control Device	Second. Device Eff. %	Combined Eff.%
Borden	Louisville, KY	E1A	Weigh Tank/ Fixed Roof	0.25	0.12	Scrubber	90	None		
Borden	Louisville, KY	E2A	Weigh Tank/ Fixed Roof	0.5	0.05	Scrubber	90	None		
Borden	Louisville, KY	E8	Recovery (phenol)	0.004	0.004	None		None		
Borden	Louisville, KY	E11	Cooling & Flaking	0.005	0.005	Scrubber	90	None		
Overall Emission Reduction for non-reactor batch process vents is 77 percent										
Dynachem	Georgetown, IL	E9	Weigh Tank	0.25	0.075	Scrubber	72	None		
Overall Emission Reduction for non-reactor batch process vents is 70 percent										
Solutia	Addyston, OH	E3	Methanol weigh tank	0.81	0.81	Vapor balance	NR	None		
Solutia	Addyston, OH	E4	Formaldehyde weigh tank	0.014	0.014	None		None		
Solutia	Addyston, OH	E7	Distillation Overhead Tank	1.44	0.22	Scrubber	85	None		
Solutia	Addyston, OH	E6	Distillation Feed Tank	0.261	0.039	Scrubber	85	None		
Solutia	Addyston, OH	E8	Distillation Bottom Tank	0.352	0.053	Scrubber	85	None		
Overall Emission Reduction for non-reactor batch process vents is 60.5 percent										

Table 6-6. BEST PERFORMING 5 FACILITIES FOR NON-REACTOR BATCH PROCESS VENTS BASED ON  
OVERALL PERCENT REDUCTION

Company	Location	Emission Point	Emission Point Description	Uncont'd Emis. (tpv)	Cont'd Emis. (tpv)	Primary Control Device	Primary Device Eff. %	Second. Control Device	Second. Device Eff. %	Combined Eff. %
Borden	Fayetteville , NC	E2	Weigh Tank	0.084	0.042	Scrubber	50	None		
Borden	Fayetteville , NC	E2	Weigh Tank	0.264	0.132	Scrubber	50	None		
Borden	Fayetteville , NC	E2	Weigh Tank	0.209	0.1045	Scrubber	50	None		
Overall Emission Reduction for non-reactor batch process vents is 50 percent										

The first step in determining the MACT floor was to establish the overall percent emission reduction for the best performing 5 facilities. The average percent emissions reduction was calculated from the best performing 5 facilities. Specifically, for each of the best performing 5 facilities, the difference of uncontrolled emissions minus controlled emissions was divided by uncontrolled emissions to establish the average percent emissions reduction for the facility. Then, the average percent emissions reductions for the best performing 5 facilities were added together and then divided by 5. The resulting average percent emissions reduction for the best performing 5 facilities is 68 percent.

Facility-wide uncontrolled emissions from non-reactor batch process vents were chosen as the applicability criteria, because it was the only available data, and because the EPA judged that the applicability criteria, like the control level, should be an overall value as opposed to an individual process vent specific value. The uncontrolled emissions cutoff of 0.23 Mg/yr (0.25 tpy) represents the smallest facility-wide uncontrolled emissions from non-reactor batch process vents for a facility in the best performing 5. The smallest value was selected to ensure that all the facilities included in setting the MACT floor would be represented by the applicability criteria.

Putting together the control level and applicability criteria, the MACT floor for non-reactor batch process vents at

existing sources requires an overall emissions reduction of 68 percent for the collection of non-reactor batch process vents within the source for sources with uncontrolled emissions from the collection of non-reactor batch process vents greater than or equal to 0.23 Mg/yr (0.25 tpy).

#### 6.6.2 MACT Floors for Non-Reactor Batch Process Vents at New Sources

The MACT floor for new sources is set by the best controlled amino/phenolic resin production facility. Using the overall emission reduction for a facility approach, the best controlled facility achieves an overall emission reduction of 83.7 percent. For purposes of the rule, this value was rounded down to 83 percent.

In considering the uncontrolled emissions cutoff for the new source MACT floor, the CAAA states that existing source standards may be less stringent than new source standards. By implication, new source standards may not be less stringent than existing source standards. Based on this, the uncontrolled facility-wide emissions cutoff of 0.23 Mg/yr (0.25 tpy) was used because the uncontrolled emissions at the best controlled facility are 96 Mg/yr (106 tpy). If the value of 96 Mg/yr (106 tpy) was used, the new source standard would be less stringent than the existing source standard. Therefore, the MACT floor for non-reactor batch process vents at new affected sources requires an overall emissions reduction of 83 percent for the collection of non-

reactor batch process vents within the affected source for affected sources with uncontrolled emissions from the collection of non-reactor batch process vents greater than or equal to 0.23 Mg/yr (0.25 tpy).

## 6.7 DETERMINATION OF MACT FLOORS FOR WASTEWATER

This section describes the approach taken for determining the MACT floor for wastewater at existing and new sources. The MACT floor for existing and new sources is based on controls at baseline.

### 6.7.1 MACT Floors for Wastewater at Existing Sources

The MACT floor for existing sources is set by the average of the best performing 12 percent of existing amino/phenolic resin production facilities. The best performing 12 percent of existing amino/phenolic resin production facilities is represented by the best performing 5 facilities. The MACT floor for existing sources is based on controls at baseline. No facilities that are major sources were identified as controlling their wastewater. Therefore, the MACT floor for existing sources is no control.

### 6.7.2 MACT Floors for Wastewater at New Sources

There are 40 facilities that are major sources in this source category. The MACT floor for new sources is set by the best controlled amino/phenolic resin production facility. Because no facilities are controlled, the MACT floor for new sources is no control.

## 6.8 DETERMINATION OF MACT FLOORS FOR EQUIPMENT LEAKS

This section describes the approach taken for determining the MACT floor and regulatory alternatives for existing and new source equipment leaks. For a more detailed discussion, please see "Equipment Leak Analysis for Amino/Phenolic Resins NESHAP," Docket Item II-B-11.

Based on data provided through surveys and follow-up telephone conversations, two amino/phenolic resin facilities were identified as having equipment leak programs subject to Federal, State, or local regulations. These two facilities are: Georgia Pacific's Elk Grove, California plant and Solutia's Springfield, Massachusetts plant. However, only one facility -- Solutia's Springfield, MA, plant -- was identified as a major source. This facility is subject to the State of Massachusetts rule 310 CMR 718(19), which essentially requires the facility to implement a leak detection and repair (LDAR) program equivalent to 40 CFR part 60, subpart VV.

### 6.8.1 MACT Floors for Equipment Leaks at Existing Sources

The MACT floor for existing sources is set by the average performance for the best performing 12 percent of existing sources. The best performing 12 percent of existing sources is represented by the best performing 5 amino/phenolic resin production facilities. The only source identified as having a LDAR program subject to local, State, or Federal regulations is Solutia's Springfield, MA, facility. A number of other

facilities have been identified as having a maintenance-type LDAR program. These maintenance-type programs are likely to be less effective at reducing emissions than the LDAR program in place at the Solutia, Springfield facility. Unfortunately, no information is available to quantify the emission reduction being achieved from these maintenance-type programs. Therefore, the average of the best performing 5 facilities cannot be defined at this time, and the MACT floor for equipment leaks for existing sources is considered to be no control.

#### 6.8.2 MACT Floors for Equipment Leaks at New Sources

The MACT floor for new sources is set by the best controlled amino/phenolic resin facility. As noted in the previous paragraph, only one major source has been identified as having a LDAR program subject to local, State, or Federal regulations, while others have maintenance-type LDAR programs. A number of facilities have been identified by the EPA as repairing leaks when they are seen or otherwise identified (e.g., smell or sound). However, these maintenance-type LDAR programs are unlikely to be more stringent than the LDAR program being implemented at Solutia's Springfield, MA, facility. Therefore, the MACT floor for equipment leaks at new sources is represented by the LDAR program at the Solutia, Springfield facility.

## 6.9 REGULATORY ALTERNATIVES BEYOND THE MACT FLOOR

This section discusses the regulatory alternatives beyond the MACT floor that were evaluated for each of the six emission points where applicable.

The MACT floor for storage vessels at existing sources was identified as 50 percent. The MACT floor for storage vessels at new sources was identified as 50 percent for aqueous formaldehyde storage vessels and 95 percent for non-aqueous formaldehyde storage vessels. For those storage vessels with a 50 percent emission reduction MACT floor, the EPA judged that the incremental emission reductions and costs would result in an incremental cost effectiveness value that was unacceptable. This judgment was based on the small incremental emission reduction that would be achieved versus the large incremental cost in moving from a scrubber to a combustion device. Although the change in percentage from 50 percent to 95 percent appears to be significant, the low level of HAP emitted from the storage vessels in this source category would yield a small incremental emission reduction being achieved.

The HON process vent provisions were evaluated as a regulatory alternative beyond the MACT floor for continuous process vents. The applicability of the HON process vent provisions (i.e., TRE value) for those continuous process vents for which stream characteristics were the basis of the analysis were evaluated. The results are presented in Table 6-7 for



existing sources and in Table 6-8 for new sources. These values were developed based on those process vents for which stream data are available; data were only available for the two process vents at the MACT floor facility (i.e., Cytec Wallingford, CT). Evaluation of the available data indicated that none of the continuous process vents for which data were available would meet the HON TRE applicability criteria.

For existing sources, the TRE values ranged from 4.4 to 93.2. Based on the calculated TRE values, it is very unlikely that any continuous process vents at an existing affected source would meet the HON TRE applicability criteria. As the TRE values show (i.e., 4.4 to 93.2), these types of continuous process vents are not cost effective to control. Therefore, the HON process vent provisions were not selected as the regulatory alternative for existing sources.

For new sources, the TRE values range from 1.2 to 25.4. While the TRE values show that none of the continuous process vents considered in the analysis would meet the HON TRE applicability for new sources, the EPA judged that if a new source were to have a continuous process vent within the cost-effectiveness accepted by the EPA (i.e., with a TRE of 1.0 or less), it should be controlled. Therefore, a two-tiered approach, utilizing the MACT floor level of control for some continuous process vents and the HON provisions for other continuous process vents, was chosen as the regulatory

alternative for new sources. The HON provisions were included in the selected regulatory alternative because it has been proven

Table 6-7. TRE ANALYSIS FOR CONTINUOUS PROCESS VENTS AT EXISTING AFFECTED SOURCES

Stream ID	E(HAP) tpy	Qs(scfm)	Ht(stream) MJ/scm	TRE (flare)	TRE (T1,0%)	TRE (T1,70%)
1	11.75	10,900	0.040	93.2	16.9	5.1
2	14.98	12,700	0.033	85.0	15.3	4.4

Stream ID Information

1 is Cytec, Wallingford - process vent (E9)

2 is Cytec, Wallingford - process vent (E13)

Table 6-8. TRE ANALYSIS FOR CONTINUOUS PROCESS VENTS AT NEW AFFECTED SOURCES

Stream ID	E(HAP) tpy	Qs(scfm)	Ht(stream) MJ/scm	TRE (flare)	TRE (T1,0%)	TRE (T1,70%)
1	11.75	10,900	0.040	25.4	4.6	1.4
2	14.98	12,700	0.033	23.2	4.2	1.2

Stream ID Information

1 is Cytec, Wallingford - process vent (E9)

2 is Cytec, Wallingford - process vent (E13)

through past analyses that the HON provisions are a cost effective approach for controlling continuous process vents. A two-tiered approach was used because the MACT floor is more stringent than the HON; the MACT floor controls continuous process vents that the HON would not control.

The proposed standard for continuous process vents at new sources utilizes the MACT floor level of control and the HON process vent provisions to establish a two-tiered standard. For continuous process vents with a TRE greater than 1.0 but less than 1.2, 85 percent emission reduction is required (i.e., MACT floor). For continuous process vents with a TRE value of 1.0 or less, 98 percent emission reduction is required (i.e., HON). For process vents with a TRE value greater than 1.2, controls are not required. TRE values are estimated using the TRE equations from the HON for a thermal incinerator with 70 percent heat recovery.

Because the MACT floor level of control for reactor batch process vents at existing sources was based on scrubbers with 93 percent control, the next step was to consider combustion controls as a regulatory alternative beyond the MACT floor. However, this option was not chosen, because the EPA judged that the incremental emission reductions and costs would result in an incremental cost effectiveness value that was unacceptable. This judgment was based on the small incremental emission reduction that would be achieved in moving from 93% emission reduction to

95% or 98% emission reduction versus the large incremental cost in moving from a scrubber to a combustion device.

Not enough information on beyond the MACT floor options for non-reactor batch process vents was available to justify selecting a regulatory alternative beyond the MACT floor.

A monitoring program to detect leaks from the process into the cooling water was selected as the standard for heat exchange systems. This monitoring program is the same as the HON program (subpart F). No MACT floor or regulatory alternatives analyses were performed, due to lack of data. Because heat exchange systems have been identified as a potential source of emissions, the EPA judges that proposing a standard to cover this emission point is warranted. However, the EPA is not aware if any heat exchange systems exist in the amino/phenolic resin industry and has solicited comments from interested persons on this subject.

The HON was considered as a regulatory alternative for both existing and new sources for wastewater streams. The first step in evaluating the HON as a regulatory alternative beyond the MACT floor was to compare the available stream data contained in the project database to the HON applicability criteria to determine whether any wastewater streams would meet the HON applicability criteria. No wastewater streams met the HON existing source or new source applicability criteria. It should be noted that there were very little data available for wastewater streams and that for those streams for which data were available, the data were

partial (i.e., indicating either wastewater flow or HAP concentration, but not both). However, based on the little data, it appeared unlikely that a wastewater stream would be covered by the HON applicability criteria.

Table 6-9 shows those streams containing HAP regulated by the HON wastewater provisions for which flow and/or concentration data were known and compares the data to the HON applicability criteria. It should be noted that the flow and concentration numbers reported by industry in the ICR and used in this analysis represent the maximum flow and concentration amounts during the process; these numbers are not believed to be representative of average flow and concentrations experienced during the process.

The HON has applicability criteria for the control of Table 9 wastewater HAP for new and existing sources. The criteria are based on the following annual concentrations and flowrates: (1) a total VOHAP concentration greater than or equal to 10,000 parts per million by weight (ppmw) (mg/l) at any flowrate, or (2) a total VOHAP concentration greater than or equal to 1,000 ppmw (mg/l) and a flowrate greater than or equal to 10 lpm (37.9 gpm). The HON also has applicability criteria for the determination for the control of Table 8 wastewater HAP for new sources only based on a concentration of any Table 8 HAP greater than or equal to 10 ppmw(mg/l) and a flowrate greater than or equal to 0.02 lpm (0.00528 gpm).

Table 6-9 shows that although several streams had either flow or concentration data that met a part of the applicability criteria, none of these streams would be covered by the HON applicability criteria.

The second step in determining the regulatory alternatives beyond the MACT floor for wastewater at existing and new sources was to develop applicability criteria cut-off models (i.e., models that will just barely be affected by the HON applicability criteria). These models were used to determine emission reductions and cost effectiveness values for wastewater streams that would just be affected by the HON. This analysis is presented in Table 6-10. Streams of methanol, propionaldehyde, and a stream with a 50/50 concentration of methanol and ethylbenzene, at flow rates from 0.25 to 25 gallons per minute at a concentration of 10,000 ppm and a stream with a flow rate of 37.9 gpm at a concentration of 1,000 ppm were chosen to be modeled. Methanol was chosen because it is the most common Table 9 HAP found in the wastewater streams shown on Table 6-9. Propionaldehyde was one of two other pollutants found in the reported wastewater streams that is a Table 9 HAP. A combination stream of methanol and ethylbenzene was chosen because methanol is the most common HAP found in the streams and because ethylbenzene had the highest fraction emitted (Fe) number and numbers equally as high as other HAP for fraction removed (Fr) and fraction measured (Fm). Flow rates of 0.25 to 25

gallons per minute were chosen because this range of flow rates is representative of the flow rate data provided by industry as shown in Table 6-9. The concentrations represent concentrations at the HON applicability criteria cutoffs.

Table 6-10 presents the results of the cost effectiveness analysis for wastewater control at both new and existing facilities. This analysis was based on steam stripping as the control option. Based on this analysis, the cost effectiveness of implementing the HON for methanol results in cost effectiveness values of approximately \$800/ton to \$41,100/ton. The cost effectiveness of implementing the HON for propionaldehyde results in cost effectiveness values of



Table 6-9. WASTEWATER FLOW AND CONCENTRATION DATA

Facility Name	Waste Water Stream ID	Table 8/9 HAP (other pollutants)	Flow-rate (gpm)	Concentration (mg/l)	New and Existing Sources HON Table 9 Criteria			New Sources HON Table 8 Criteria >0.00528 gpm and >10 mg/l
					≥10,000 (mg/l) and any flow	≥1,000 (mg/l) and ≥37.9 gpm	≥10 mg/L and ≥ 0.00528 gpm	
Borden, Louisville, KY	E2A	methanol, (formaldehyde)	2.5	no data	not caught	not caught	not caught	NA
Borden, Louisville, KY	E5	methanol, (formaldehyde)	2.5	no data	not caught	not caught	not caught	NA
Cytec, Wallingford, CT	E23,34,35,36	methanol, (formaldehyde)	1.5	no data	not caught	not caught	not caught	NA
Cytec, Cottage Grove, MN	E1	methanol, (formaldehyde)	3	no data	not caught	not caught	not caught	NA
Cytec, Cottage Grove, MN	E9	methanol, (formaldehyde)	100	no data	not caught	not caught	flow <sup>c</sup>	NA
Solutia, Springfield, MA	E3	methanol, (formaldehyde)	20	4 methanol, 1,100 formaldehyde	not caught	not caught	not caught	NA
Solutia, Springfield, MA	E6	methanol, (formaldehyde)	3	60 methanol, 900 formaldehyde	not caught	not caught	not caught	NA

Table 6-9. WASTEWATER FLOW AND CONCENTRATION DATA

Facility Name	Waste Water Stream ID	Table 8/9 HAP (other pollutants)	Flow-rate (gpm)	Concentration (mg/l)	New and Existing Sources HON Table 9 Criteria			New Sources HON Table 8 Criteria >0.00528 gpm and >10 mg/l
					≥10,000 (mg/l) and any flow	≥1,000 (mg/l) and ≥37.9 gpm	≥10 mg/L and ≥ 0.00528 gpm	
Akzo, Louisville, KY	no data	no data	0.013	no data	not caught	not caught	not caught	NA
AVERAGE			11.6	5649				

<sup>a</sup> Pollutants in parentheses are not Table 8/9 HAPs; these pollutants were included because they are present in the wastewater streams and affect the concentration of the stream.

<sup>b</sup> The reported value is a maximum flow rate. The stream would be caught by the HON at this flow rate. However, since minimum flow rates were not reported it cannot be ascertained for certain if the stream would be caught when averaged over a 24 hour period.

<sup>c</sup> "Flow" or "conc" means these streams meet the applicability criteria for flow (i.e. 37.9 gpm) or concentration (i.e. 1,000 mg/l), respectively.

<sup>d</sup> This wastewater stream does not contain any Table 8 HAP.

approximately \$300/ton to \$15,200/ton. The cost effectiveness of implementing the HON for the combination stream results in cost effectiveness values of approximately \$400/ton to \$21,500/ton. Table 6-10 shows that for a concentration of 10,000 mg/l, the higher the flow rate, the more cost effective it is to control that stream.

The MACT floor for wastewater for existing sources is no control. Based on the regulatory alternatives beyond the MACT floor analysis, the EPA judged that implementing the HON would be cost effective. However, as shown in Table 6-10, the best available data do not indicate that any wastewater streams at existing facilities will definitely require control. Without an indication that imposition of the HON wastewater standards would achieve any amount of emission reductions at existing sources, the EPA did not find the cost of the applicability analysis and recordkeeping and reporting requirements of the regulatory alternative beyond the MACT floor option to industry to be justified. Therefore, the standard selected for existing sources was no control.

Table 6-10. EMISSION REDUCTIONS AND COST EFFECTIVENESS  
FOR SELECTED WASTEWATER STREAMS

Methanol									
Model Stream ID	Flow Rate (gpm)	Mass WW (lb/min)	Concentration (parts per million)		(tons per year)			Total Annual Cost (\$) <sup>f</sup>	Cost Effectiveness (\$ per ton)
			Method 305 <sup>a</sup>	Absolute <sup>b</sup>	Total Mass <sup>c</sup>	Emissions <sup>d</sup>	Emissions Reduction <sup>e</sup>		
1	0.25	2.1	10,000	11,765	6.5	1.1	2.0	\$82,330	\$41,149
2	1	8.4	10,000	11,765	25.8	4.4	8.0	\$92,590	\$11,569
3	2	16.7	10,000	11,765	51.6	8.8	16.0	\$99,760	\$6,233
4	3	25.1	10,000	11,765	77.4	13.2	24.0	\$104,770	\$4,364
5	5	41.8	10,000	11,765	129.1	21.9	40.0	\$112,390	\$2,809
6	10	83.5	10,000	11,765	258.2	43.9	80.0	\$128,320	\$1,603
7	15	125.3	10,000	11,765	387.2	65.8	120.0	\$140,920	\$1,174
8	20	167.0	10,000	11,765	516.3	87.8	160.1	\$152,110	\$950
9	25	208.8	10,000	11,765	645.4	109.7	200.1	\$162,450	\$812
10	37.9	316.5	1,000	1,176	97.8	16.6	30.3	\$186,700	\$6,155
Propionaldehyde									
1	0.25	2.1	10,000	10,000	5.5	2.2	5.4	\$82,330	\$15,159
2	1	8.4	10,000	10,000	21.9	9.0	21.7	\$92,590	\$4,262
3	2	16.7	10,000	10,000	43.9	18.0	43.4	\$99,760	\$2,296
4	3	25.1	10,000	10,000	65.8	27.0	65.2	\$104,770	\$1,608
5	5	41.8	10,000	10,000	109.7	45.0	108.6	\$112,390	\$1,035
6	10	83.5	10,000	10,000	219.4	90.0	217.2	\$128,320	\$591
7	15	125.3	10,000	10,000	329.2	135.0	325.9	\$140,920	\$432
8	20	167.0	10,000	10,000	438.9	179.9	434.5	\$152,110	\$350
9	25	208.8	10,000	10,000	548.6	224.9	543.1	\$162,450	\$299
10	37.9	316.5	1,000	1,000	83.2	34.1	82.3	\$186,700	\$2,268

Table 6-10. EMISSION REDUCTIONS AND COST EFFECTIVENESS  
FOR SELECTED WASTEWATER STREAMS

Methanol/EthylBenzene									
Model Stream ID	Flow Rate (gpm)	Mass WW (lb/min)	Concentration (parts per million)		(tons per year)			Total Annual Cost (\$) <sup>f</sup>	Cost Effectiveness (\$ per ton)
			Method 305 <sup>a</sup>	Absolute <sup>b</sup>	Total Mass <sup>c</sup>	Emissions <sup>d</sup>	Emissions Reduction <sup>e</sup>		
1	0.25	2.1	10,000	10,753	5.9	2.9	3.8	\$82,330	\$21,472
2	1	8.4	10,000	10,753	23.6	11.8	15.3	\$92,590	\$6,037
3	2	16.7	10,000	10,753	47.2	23.6	30.7	\$99,760	\$3,252
4	3	25.1	10,000	10,753	70.8	35.4	46.0	\$104,770	\$2,277
5	5	41.8	10,000	10,753	118.0	59.0	76.7	\$112,390	\$1,466
6	10	83.5	10,000	10,753	236.0	118.0	153.4	\$128,320	\$837
7	15	125.3	10,000	10,753	353.9	177.0	230.1	\$140,920	\$613
8	20	167.0	10,000	10,753	471.9	236.0	306.7	\$152,110	\$496
9	25	208.8	10,000	10,753	589.9	294.9	383.4	\$162,450	\$424
10	37.9	316.5	1,000	1,075	89.4	44.7	58.1	\$186,700	\$3,212

<sup>a</sup> Concentration as measured using Method 305. The value measured using Method 305 is the value to be compared with the HON applicability criteria for concentration. Dividing a concentration measured using Method 305 by the  $F_m$  (fraction measured) value yields the absolute concentration.

<sup>b</sup> Concentration as measured using a method other than Method 305. The absolute value is used as the basis for estimating emissions and emission reductions. Multiplying the absolute concentration by the  $F_m$  (fraction measured) value yields the Method 305 concentration.

<sup>c</sup> Total mass of HAP in water.

<sup>d</sup> HAP air emissions.

<sup>e</sup> HAP air emission reductions.

<sup>f</sup> Costs based on steam stripping.

However, the HON was chosen by EPA as the standard for new sources. The EPA believes that because new sources will already be required to characterize their emissions for the Title V permit application, the additional cost of the applicability analysis associated with the wastewater provisions would be acceptable given the potential for reducing emissions.

For equipment leaks at existing sources, two regulatory alternatives were identified -- (1) 40 CFR part 60, subpart VV and (2) the Hazardous Organic NESHAP (HON) LDAR program under 40 CFR part 63, subpart H (referred to hereafter as the HON LDAR program). Table 6-11 provides a brief summary of subpart VV's and the HON's LDAR program. For new sources, the regulatory alternative evaluated was the application of the HON LDAR program, because the MACT floor is equivalent to the subpart VV program.

In conducting the regulatory analysis, there are several items that need to be identified to determine whether or not any of the regulatory alternatives are cost effective. First, component counts for each of the major sources need to be determined. Second, estimates of emissions and emission reductions need to be made. Third, the costs associated with the LDAR programs need to be estimated. The following paragraphs present the methods used in the regulatory alternative analysis.

Table 6-11. SUMMARY OF LDAR REGULATORY ALTERNATIVES

Component and Service	40 CFR Part 60, Subpart VV	40 CFR Part 63, Subpart H
Valves, gas/vapor and light liquid	Monthly monitoring with skip period option for quarterly monitoring. Leak definition = 10,000 ppm.	Quarterly monitoring with leak definition of 500 ppm (Phase III).
Valves, heavy liquid Pumps, heavy liquid	If indication of leak (sight, sound, smell), monitor to confirm leak (leak definition = 10,000 ppm) and then repair.	
Pumps, light liquid	Monitor monthly with weekly visual inspection. Leak definition = 10,000.	Monitor monthly with weekly visual inspections. Leak definition = 5,000 (Phase III).
Compressors	Use of barrier fluid system that prevents leakage of VOC to atmosphere.	
Open Ended Lines	Caps, blind flanges, etc.	
Pressure Relief Devices, gas/vapor	No detectable emissions	
Pressure Relief Devices, light or heavy liquid	If indication of leak (sight, sound, smell), monitor to confirm leak (leak definition = 10,000 ppm) and then repair.	
Sampling Connections	Closed purge system or closed vent system to control device	
Flanges and other connectors, gas/vapor	If indication of leak (sight, sound, smell), monitor to confirm leak (leak definition = 10,000 ppm) and then repair.	Annual monitoring with leak definition of 10,000.
Flanges and other connectors, light liquid		
Flanges and other connectors, heavy liquid	If indication of leak (sight, sound, smell), monitor to confirm leak (leak definition = 10,000 ppm) and then repair.	

A questionnaire was sent to companies requesting specific information on component counts, the weight percent HAP contacting the components, and time the component is in contact with the HAP. Facilities were also given the option of providing information on the number of storage vessels, from which the number of components would be estimated. Facilities that use only heavy liquids in their process were asked to provide information on the number of storage vessels only.

Emissions for each facility were estimated using equipment counts and emission factors for uncontrolled emissions. Equipment counts were either provided by the facility or estimated based on the number and type of storage vessels. Emissions were estimated for each of the two basic LDAR programs identified as regulatory alternatives. In addition, the level of emissions were adjusted based on the percent HAP and time in contact with HAP if this information was provided by the facility. If facilities did not provide this information, default values of 100 percent HAP and 8,760 hours per year of contact time were used to estimate emissions.

Costs (1989 \$) were estimated for each facility except for those that use heavy liquids only. The following paragraphs discuss selected aspects of the costing used for the LDAR programs. Complete details can be found in "Equipment Leak Analysis for Amino/Phenolic Resins NESHAP," Docket Item II-B-11.



Type of Monitoring Program. Facilities may use in-house or subcontractor personnel to conduct a LDAR program. Because of the relatively low number of components at most amino/phenolic resins facilities, it was assumed that each facility would elect to use in-house personnel, which should reduce the cost of implementation, in part, by avoiding travel to monitor pumps.

Monitoring Instrument. Facilities must decide whether to purchase or rent a monitoring instrument. The cost of a basic monitoring instrument and its annual maintenance are estimated to be \$6,500 and \$4,260, respectively, while the cost to rent an instrument (including shipping) is estimated to be range from \$164 for one day of monitoring up to \$760 for a 15-day monitoring period. Because of the relatively low number of components, rental of a monitoring instrument was estimated to be always less expensive than the purchase and maintenance of the instrument.

Logging vs Tagging. In implementing a LDAR program, a decision must be made as to whether to tag the components initially or to enter them into a log. Again, because of the relatively low number of components, it was assumed that all facilities would log their components rather than tag them.

Database System. Another decision to be made at the outset of implementing a LDAR program is whether to purchase a database system or use other means (e.g., a log book) to track the components subject to the LDAR and those components identified as leaking. It was assumed that all facilities with 500 or fewer

components subject to monitoring would purchase a simple spreadsheet to track the components, while those with facilities with more than 500 components subject to monitoring would purchase a more expensive database system.

Reporting, Recordkeeping, Training, Administration. These activities are required for each facility to implement and maintain a LDAR program. There are both initial costs (e.g., training of personnel) and annual costs (e.g., report preparation) associated with the implementation of a LDAR program. For the purposes of the cost analysis, the following assumptions were made as to the number of technical hours required to implement the LDAR programs. Because the SOCM I program does not cover connectors, a slightly reduced level of effort was assumed for that LDAR program.

	Initial Hours	Annual Hours
SOCMI LDAR:	44	183
HON LDAR:	60	200

Table 6-12 presents the results of the cost effectiveness analysis for both new and existing facilities. Based on this analysis, the average cost effectiveness of implementing the SOCM I Subpart VV LDAR program from baseline at each of the amino/phenolic resin facilities is approximately \$4,207 per megagram of emission reduction. The average incremental cost effectiveness of implementing the HON LDAR program from baseline is approximately \$2,608 per megagram of emission reduction. The

average incremental cost effectiveness of going from the SOCMI Subpart VV program to the HON program is approximately \$1,343 per megagram of emission reduction.

The EPA judged the incremental cost effectiveness of the HON LDAR program to be reasonable and, therefore, selected the HON LDAR program as the proposed standards for equipment leaks at both existing and new sources.

Table 6-12. Summary of Regulatory Analysis  
for Equipment Leaks

Item	SOCMI, subpart VV	HON
Emission Reduction from Baseline (Mg/yr)	52.6	119.0
Costs (\$)	221,313	310,465
Cost Effectiveness (\$/Mg)	4,207	2,608
Incremental Emission Reduction (Mg/yr)	--	66.4
Incremental Costs (\$)	--	89,152
Incremental Cost Effectiveness (\$/Mg)	--	1,343

## 7.0 SUMMARY OF ENVIRONMENTAL, ENERGY, COST, AND ECONOMIC IMPACTS

This chapter presents the air, non-air environmental (solid waste and wastewater), energy, cost, and economic impacts resulting from the control of organic HAP emissions under the proposed rule. In addition, this chapter presents a summary of the costing for batch process vents, storage vessels, and equipment leaks.

### 7.1 FACILITIES AFFECTED BY THIS NESHP

The proposed rule would affect amino/phenolic resin facilities that are major sources in themselves, or that are located within a major source. Based on available information, 40 amino/phenolic resins facilities were judged to be major sources (see "Major source population of amino and phenolic resin facilities for purposes of MACT analysis" memorandum, Docket Item II-B-10).

Impacts are presented relative to a baseline reflecting the level of control in the absence of the rule. The estimation of impacts only includes applying controls to the 40 major existing facilities because, as discussed in Section 7.6, no new facilities are expected to be constructed.

The impacts for existing sources were estimated by applying the controls necessary to bring each facility into compliance with the proposed standards. For a facility or emission point within a facility already in compliance with the proposed

standards, no impacts were estimated for that facility or emission point.

## 7.2 PRIMARY AIR IMPACTS

The proposed standards are estimated to reduce organic HAP emissions from all existing sources by 361 Mg/yr from a baseline level of 644 Mg/yr. This is a 56 percent reduction. Table 7-1 summarizes the organic HAP emission reductions for each of the emission points.

Table 7-1. ORGANIC HAP EMISSION REDUCTIONS BY EMISSION POINT FOR EXISTING SOURCES

Emission Point	Baseline Emissions (Mg/yr)	Emissions After Proposed Rule (Mg/yr)	Emission Reduction (Mg/yr)	Percent Reduction (%)
Reactor Batch Process Vents	202.4	20.0	182.4	90.1
Non-reactor Batch Process Vents	109.0	49.1	59.9	55.0
Continuous Process Vents	116.4	116.4	0	0
Storage Vessels	65.4	65.3	0.1	0.2
Wastewater	6.1	6.1	0	0
Equipment Leaks	144.6	25.6	119.0	82.3
Total	643.9	282.5	361.4	56.1

## 7.3 NON-AIR ENVIRONMENTAL IMPACTS

The proposed standards are not expected to increase the generation of solid waste at any amino/phenolic resin facility.

The use of scrubbers to control emissions will increase water consumption as a result of evaporation and bleed-off. Bleed-off is the release of a small percentage of the re-circulated scrubber water to control buildup or accumulation of scale, or other contaminants. Scrubbers designed to capture emissions from reactor and non-reactor batch process vents are small in size and should require less than 100 gallons of bleed-off per day per reactor.

Many of the HAP being controlled by scrubbers are water soluble, with very low evaporation rates once in water. Therefore, the EPA does not expect the HAP to be released from the scrubber wastewater at a point downstream from the scrubber.

In general, the EPA expects the adverse impact of the wastewater generated by the scrubbers to be small to negligible. First, the HAP contained in the wastewater from the scrubber are very susceptible to being eaten by the various bacteria found in wastewater treatment plants. Thus, for those facilities that send or will send the scrubber wastewater to a wastewater treatment facility, there should be minimal adverse impacts.

Some facilities may not be able to send their scrubber wastewater to a treatment facility. These facilities may be able to recycle all of the scrubber wastewater within the facility. From information gathered through site visits and telephone conversations with industry, the EPA determined that some facilities recycle wastewater containing the predominant HAP

emitted by batch process vents (i.e., formaldehyde, methanol, and phenol). Three resin plants visited by the EPA collected and reused their wastewater. The recovered wastewater contains the raw materials used in the reactor process. Recycling wastewater into the resin manufacturing process reduces the quantities of raw materials required to be purchased, thereby reducing costs. Based on telephone conversations with industry, one resin manufacturer uses a water pit to collect emissions from the reactor. Water is removed from the pit when the formaldehyde concentration reaches approximately three percent and is placed in a storage tank. The stored water is added to raw materials in the reactors to establish the proper viscosity at the beginning of a resin batch.

In summary, the EPA expects that affected facilities will be able to either send the scrubber wastewater to a treatment facility or recycle the scrubber wastewater back into the process. Therefore, the use of scrubbers will result in minimal, if any, adverse wastewater impacts.

#### 7.4 ENERGY IMPACTS

Energy impacts include changes in energy use, typically increases, and secondary air impacts associated with increased energy use. Increases in energy use are associated with fuel for the operation of control equipment; in this case, the use of scrubbers to control reactor vents. Energy credits are attributable to the prevention of organic HAP emissions from



equipment leaks. Secondary air impacts associated with increased energy use are the emission of particulates, sulfur dioxides ( $\text{SO}_x$ ), and nitrogen oxide ( $\text{NO}_x$ ). These secondary impacts are associated with power plants that would supply the increased energy demand. (For more information on the calculation of the estimated energy impacts, see the "Estimated Energy and Secondary Air Impacts" memorandum, Docket Item II-B-16.)

As noted above, energy use is expected to increase due to the use of scrubbers to control reactor vents which would be used to comply with the proposed rule. The use of scrubbers is estimated to increase energy use by approximately 2,340 barrels of oil per year for the 40 existing major sources. The emissions of secondary air pollutants from power plants supplying the power for this energy increase are estimated to be 3 Mg/yr of filterable particulate, 15 Mg/yr of  $\text{SO}_x$ , and 0.3 Mg/yr of  $\text{NO}_x$ .

At the same time, the prevention of organic HAP emissions from equipment leaks generates energy credits. These energy credits are expected to be relatively small and have not been estimated.

Energy impacts related to the control of storage vessels were estimated to be negligible (or zero) because many storage vessels would be controlled through the use of internal floating roofs, which do not have any associated energy impacts.

As stated above, the use of scrubbers results in an increase of oil consumption per year for the 40 major existing affected

sources. The net increase will be smaller due to the energy credits generated by the control of equipment leak emissions. Given the relatively small energy impact projected from the control of batch process vents, the EPA has judged the energy impacts associated with the proposed rule to be acceptable.

#### 7.5 COST IMPACTS

Cost impacts include the capital costs of new control equipment, the cost of energy (supplemental fuel and electricity) required to operate control equipment, operation and maintenance costs, and the cost savings generated by reducing the loss of valuable product in the form of emissions. Also, cost impacts include the costs of monitoring, recordkeeping, and reporting associated with the proposed standards. Average cost effectiveness (\$/Mg of pollutant removed) is also presented as part of cost impacts and is determined by dividing the annual cost by the annual emission reduction. Table 7-2 presents the estimated capital and annual costs and average cost effectiveness for complying with the proposed rule by existing affected sources. There are no estimated cost impacts for new facilities, because no new facilities are expected to be constructed.

Under the proposed rule, it is estimated that total capital costs for existing sources would be \$2,157,400 (1989 dollars), and total annual costs would be \$1,597,800 (1989 dollars) per year. The use of 1989 dollars in estimating the costs associated with the proposed standards was done in order to be consistent

with the cost effectiveness decisions reached for setting the HON standards, which form the basis for most of the standards being proposed for the amino/phenolic source category. The actual compliance cost impacts of the proposed rule may be less than presented because of the potential to use common control devices, to upgrade existing control devices, and to vent emissions streams into current control devices. Because the effect of such practices is highly site-specific and data were unavailable to estimate how often the lower cost compliance practices could be utilized, it is not possible to quantify the amount by which actual compliance costs would be reduced.

The following paragraphs discuss the costing used to develop the cost impacts for batch process vents, storage vessels, and equipment leaks. Following these paragraphs is a brief discussion on the monitoring, recordkeeping, and reporting costs estimated for the proposed rule. These latter costs are included in the cost estimates reported in Table 7-2.

Table 7-2. SUMMARY OF COST IMPACTS

Emission Point	Total Capital Costs (\$1,000)	Total Annual Costs (\$1,000)	Average Cost Effectiveness (\$/Mg)
Reactor and Non-reactor Batch Process Vents	1,687	1,279	5,280
Continuous Process Vents	0	0	NA
Storage Vessels	31.6	8.3	83,000

Wastewater	0	0	NA
Equipment Leaks	438.8	310.5	2,608
Total	2,157.4	1,597.8	4,420

For more detailed information on the costing procedures, please refer to the following memoranda:

- Batch Process Vents Analysis for Amino/Phenolic Resins  
NESHAP, Docket Item II-B-12.
- Storage Vessels Analysis for Amino/Phenolic Resins  
NESHAP, Docket Item II-B-13.
- Equipment Leak Analysis for Amino/Phenolic Resins  
NESHAP, Docket Item II-B-11.

#### 7.5.1 Reactor and Non-reactor Batch Process Vent Costs

Industry currently uses scrubbers and thermal incinerators to control emissions from amino/phenolic resin production. The three largest HAP in the emission stream are formaldehyde, methanol, and phenol. All three compounds are readily absorbed in water. Therefore, control device costing was based on the installation of a scrubber to control the plant emission stream from reactor and non-reactor batch process vents.

HAPPRO was used to calculate the total capital costs, fixed annual costs, and annual variable costs. The total annual cost for control is the sum of annual variable cost, annual fixed cost, and the variable annual electrical cost. HAPPRO is a U.S. Environmental Protection Agency computer program used as an aid

in costing pollution control devices. It is based on the OAQPS Control Cost Manual, EPA 453/B-96-001.

In order to use HAPPRO for this analysis, several assumptions had to be made. One major assumption was reactor size, which was assumed to be 20,000 gallons. A second major assumption was the level of production, which was based on a conservative assumption of 12 hours per day for each batch of amino/phenolic resin. (A batch of resin can be produced in 8 hours if conditions are normal.) Annual hours of production were assumed to be 24 hours per day and 300 days per year, totaling 7,200 hours per year production time for each reactor. Finally, air stream flow rate was estimated to be 114 standard cubic feet per minute (scfm) per 1,000 gallons of reactor capacity. Using these assumptions and the annual reported production data, the number of reactors per facility, the number of operating hours, and the air stream flow rate to the scrubber were calculated. This information, along with other data, was used in the HAPPRO program for calculating control equipment costing.

#### 7.5.2 Storage Vessels Costs

Storage vessel costs were based on the application of internal floating roofs. This technology is an over estimate of the emission reduction required (i.e., 95 percent vs. the required 50 percent); however, the technology is technically feasible for storage vessels with these vapor pressures and costs for this technology were readily available.

Control costs were estimated for those storage vessels that did not already have controls applied but met the applicability criteria described in Chapter 6. Only one storage vessel at an existing affected source requires control under the standard at a total annual cost of \$8,300/yr. Total capital costs are \$31,600.

### 7.5.3 Equipment Leak Costs

The proposed rule would require facilities to implement, with some changes, the leak detection and repair (LDAR) found in 40 CFR part 63, subpart H. Differences in the proposed rule compared to subpart H that may reduce the estimated costs, but which were not included in the costing algorithms used in this analysis, are (1) the option to group valves and (2) the increased monitoring frequencies for facilities that demonstrate lower leak frequencies (e.g., monitoring connectors once every 8 years rather than once every 4 years).

The basic costing algorithms used to develop the LDAR cost estimates were derived from the work used to support the hazardous organic NESHAP (HON) equipment leak standards, which are found in 40 CFR part 63, subpart H. Major variations or assumptions used in developing the LDAR costs for the amino/phenolic resin facilities are as follows:

- In-house personnel rather than subcontracting personnel were assumed to be responsible for implementing the LDAR program.
- The monitoring instrument was assumed to be rented rather than purchased.

- Facilities with fewer than 500 or fewer components subject to Method 21 monitoring were assumed not to require the purchase of a database system; those with more than 500 components subject to Method 21 monitoring were assumed to purchase a spreadsheet program for tracking components.
- Facilities would "locate and log" the components subject to Method 21 monitoring rather than "locate and tag" these components.

Emission reduction credits were assigned based on the specific compounds being reduced. This reduced the overall total annual costs attributable to the proposed rule.

#### 7.5.4 Monitoring, Recordkeeping, and Reporting Costs

Additional costs for monitoring, recordkeeping, and reporting were developed for a typical amino/phenolic resin facility. The typical facility was assumed to have reactor and non-reactor batch process vents and an equipment leaks LDAR program. Monitoring, recordkeeping, and reporting costs were not developed for continuous process vents or wastewater because they are not being regulated at existing facilities. Storage vessels were not included because most facilities will not have to control their storage vessels.

The estimated additional costs for monitoring, recordkeeping, and reporting at a typical facility is estimated to be 1,217 hours and \$41,092 during the first year. This estimate decreases to 600 hours and \$19,310 per year afterward. Detailed assumptions used to derive these cost estimates can be found in the OMB 83-1 Form and Supporting Statement. A copy of

the OMB 83-1 Form and Supporting Statement may be obtained by sending written correspondence to the Director, OPPE Regulatory Information Division; U. S. Environmental Protection Agency (2136), 401 M St. S.W., Washington, DC 20460, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th St. N.W., Washington, DC 20503, marked "Attention: Desk Officer for EPA." Include the ICR number in any correspondence.

#### 7.6 ECONOMIC IMPACTS

An economic impact analysis for the proposed rule estimated the impacts to affected businesses in the amino/phenolic resins source category. Prices for products from the 20 businesses that operate the 40 facilities affected by this rule are estimated to increase by 0.3 percent for amino resin businesses and 0.2 percent for phenolic resin businesses. Output for these products are estimated to decrease by 0.2 for amino resin businesses and 0.1 percent for phenolic resin businesses. Revenues for the entire industry are estimated to increase by 0.2 percent, and this is due to the expected increase in product prices resulting from the proposed rule that will be experienced by amino/phenolic resin producers that are not affected by this rule. The level of employment in these industries is estimated to fall by about 5 percent based on estimates to adversely affected businesses only. No facilities are estimated to be at risk of closure from costs associated with this proposed rule.



For more information, refer to the Economic Impact Analysis of the Proposed National Emission Standard for Hazardous Air Pollutants: Manufacture of Amino/Phenolic Resins (contained in the docket for this rule).

## 8.0 SUMMARY OF PROPOSED STANDARDS

The purpose of this chapter is to present a summary of the proposed standards. The rationale associated with the selection of the proposed standards is provided in the preamble and in Chapter 6 of this document. The full regulatory text is available in Docket A-92-19, directly from the EPA. More information on how to obtain a copy of the proposed standards is provided in the preamble.

### 8.1 SOURCE CATEGORY TO BE REGULATED AND DEFINITION OF AFFECTED SOURCE

The proposed rule would regulate organic HAP emissions from facilities in the amino/phenolic resin source category, provided that a facility is determined to be a major source. The proposed rule defines amino/phenolic, amino, and phenolic resins as follows:

Amino/Phenolic Resin means one or both of the following types of resins:

- (1) Amino resin, or
- (2) Phenolic resin.

Amino resin means a resin produced through the reaction of formaldehyde, or a formaldehyde containing solution (e.g., aqueous formaldehyde), with compound(s) that contain the amino group; these compounds include melamine, urea, and urea derivatives.

Phenolic resin means a resin that is a condensation product of formaldehyde and phenol, or a formaldehyde substitute and/or a phenol substitute. Substitutes for formaldehyde include acetaldehyde or furfuraldehyde. Substitutes for phenol include other phenolic starting compounds such as cresols, xylenols, p-tert-butylphenol, p-phenylphenol, and nonylphenol.

The proposed rule would regulate existing and new affected sources. For this proposed rule, an affected source is defined as each group of one or more amino/phenolic resin process units (APPU) that is located at a plant site that is a major source. An APPU is defined as follows:

Amino/Phenolic Resin Process Unit (APPU) means a collection of equipment assembled and connected by hard-piping or ductwork used to process raw materials and to manufacture an amino/phenolic resin as its primary product. This collection of equipment includes process vents from process vessels; equipment identified in §63.149; storage vessels, as determined in §63.1400(g); and the equipment that is subject to the equipment leak provisions as specified in §63.1415. Utilities, lines and equipment not containing process fluids, and other non-process lines, such as heating and cooling systems which do not combine their materials with those in the processes they serve, are not part of the amino/phenolic resin process unit. An amino/phenolic resin process unit consists of more than one unit operation.

In addition to the emission points and/or equipment included in the definition of APPU, the affected source includes waste management units, maintenance wastewater, heat exchange systems, and equipment used to comply with this rule, including control devices and recovery devices.

## 8.2 RELATIONSHIP TO OTHER RULES

Affected sources subject to the proposed rule may also be subject to other existing rules. The relationship between this rule and three other rules is discussed below. See proposed §63.1401(g)-(i).

Affected sources subject to the proposed rule may have storage vessels subject to the NSPS for Volatile Organic Liquid Storage Vessels (40 CFR part 60, subpart Kb). For storage vessels subject to and complying with the NSPS, the proposed rule requires that such storage vessels remain in compliance with the NSPS because the NSPS level of control (i.e., 95%) is more stringent than the control level for the proposed rule (i.e., 50%). For storage vessels subject to the NSPS but that did not have to apply controls (e.g., the storage vessels stores an organic liquid but the vapor pressure of the stored material is below the applicability criteria), the proposed rule states that after the compliance date for the proposed rule, such storage vessels are only required to comply with the proposed rule and are no longer subject to subpart Kb.

Affected sources subject to the proposed rule may have cooling towers subject to the NESHAP for Industrial Cooling Towers (40 CFR part 63, subpart Q). There is no conflict between the requirements of subpart Q and the proposed rule. Subpart Q prohibits the use of certain chemicals in the cooling tower water, and the proposed rule implements a leak detection and

repair program for organic HAP. Therefore, affected sources subject to both rules must comply with both rules.

Affected sources subject to the proposed rule may also be subject to the Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry (SOCMI LDAR) (40 CFR part 60, subpart VV) and/or the National Emission Standards for Organic Hazardous Air Pollutants for Equipment Leaks (HON NESHAP LDAR)(40 CFR part 63, subpart H). After the compliance date for the proposed rule, such affected sources are only required to comply with the proposed rule and are no longer subject to CFR part 60 subpart VV or to CFR part 63 subpart H. The proposed rule directly references the HON provisions contained in subpart H, and therefore is equivalent to the HON. The HON is more stringent than the subpart VV.

Another likely instance of interaction between the proposed rule and other rules is related to storage vessels already covered by the HON; this is likely to occur at amino/phenolic resin facilities that are collocated with formaldehyde plants subject to the HON. In such cases, a methanol storage vessel supplying methanol to the amino/phenolic resin facility is likely to be subject to the HON. The storage vessel assignment procedures in the proposed rule address such situations. If a storage vessel is already subject to another part 63 standard, that storage vessel is considered to be assigned to the process

unit subject to the part 63 standard and is not subject to the proposed rule.

### 8.3 POLLUTANTS TO BE REGULATED

The facilities in the source category covered by the proposed rule emit a variety of organic HAP. Among the most significant emissions of organic HAP are the following: formaldehyde, methanol, phenol, xylene, and toluene. The proposed rule would regulate emissions of these compounds, as well as a variety of other organic HAP that are emitted.

### 8.4 AFFECTED EMISSION POINTS

Emissions from the following emission points are being covered by the proposed rule: storage vessels, continuous process vents, batch process vents, equipment leaks, wastewater, and heat exchange systems.

### 8.5 FORMAT OF THE STANDARD

The Hazardous Organic NESHAP (HON) (subparts F, G, H, and I of 40 CFR part 63) is relied on heavily and provides the basis for selection of the proposed formats for the majority of emission points. For those emission points relying on the HON (i.e., storage vessels, continuous process vents, heat exchange systems, wastewater, and equipment leaks), the format of the proposed standards is the same as those found in the HON. The following paragraphs summarize the selected formats.

For storage vessels, the format of the proposed standards is dependent on the method selected to comply with the standards.

If tank improvements (e.g., internal or external floating roofs with proper seals and fittings) are selected, the format is a combination of design, equipment, work practice, and operational standards. If a closed vent system and control device are selected, the format is a combination of design and equipment standards, and a percent reduction or outlet concentration. As an alternate standard, the proposed rule allows emissions from storage vessels to be vented to a control device continuously achieving an outlet concentration of 20 ppmv of organic HAP. In this case the format is an outlet concentration.

For continuous process vents, the format of the proposed standards is also dependent on the method selected to comply with the standards. If a control device other than a flare is used, the formats are a percent reduction or an outlet concentration. If a flare is selected, the format is a combination of equipment and operating specifications. Like storage vessels, the proposed rule allows compliance by venting emissions to a control device continuously achieving an outlet concentration of 20 ppmv of organic HAP.

For batch process vents the format depends on the type of batch process vent. For reactor batch process vents, a percent reduction and an emission limit were selected. The standard requires that emissions are reduced by a certain percent (i.e., 93 percent at existing affected sources and 95 percent at new affected sources) over the batch cycle. As an alternative, the

standard allows a demonstration that emissions are limited to 0.017 kg of HAP per megagram of product at existing affected sources or 0.01 kg of HAP per megagram of product at new affected sources. For non-reactor batch process vents, the standard requires that emissions for the collection of non-reactor batch process vents within the affected source are reduced by 68 percent at existing affected sources and by 83 percent at new affected sources. Like continuous process vents, if a flare is selected, the format is a combination of equipment and operating specifications. Like storage vessels and continuous process vents, the proposed rule allows compliance by venting emissions to a control device continuously achieving an outlet concentration of 20 ppmv of organic HAP.

For heat exchange systems, a work practice standard is proposed. This standard requires a leak detection and repair program to detect and repair leaks of organic HAP into cooling tower water.

For wastewater streams requiring control, the proposed standards incorporate several formats: equipment, operational, work practice, and emission standards. The particular format selected depends on which portion of the wastewater stream is involved. For transport and handling equipment, the selected format is a combination of equipment standards and work practices. For the reduction of organic HAP from the wastewater stream itself, several alternative formats are included,



including alternative numerical emission limit formats and equipment design and operation standard for a steam stripper. For vapor recovery and destruction devices other than flares, the format is a weight percent reduction. For flares, the format is a combination of equipment and operating specifications.

For equipment leaks, the proposed standards incorporate several formats: equipment, design, base performance levels (e.g., maximum allowable percent leaking valves), work practices, and operational practices. Different formats are necessary for different types of equipment because of the nature of the equipment, available control techniques, and applicability of the measurement method.

#### 8.6 SUMMARY OF THE PROPOSED STANDARDS

Detailed information describing the approach used to determine MACT floors and the consideration of regulatory alternatives is presented in Chapter 6 of this document and in Section V of this preamble.

The proposed standards for new and existing affected sources are summarized in Table 8-1 and Table 8-2, respectively. The sections below present the proposed standards by emission point.

Table 8-1. PROPOSED STANDARDS FOR NEW AFFECTED SOURCES

Emission Point	Applicability Criteria	Standard
Storage Vessels	<p>for aqueous formaldehyde vessels; vessels with capacities of 10,000 gallons or greater with vapor pressures of 0.47 psia or greater</p> <p>for non-aqueous formaldehyde vessels; vessels with capacities of 10,160 gallons or greater with vapor pressures of 2.45 psia or greater <u>and</u> vessels with capacities of 90,000 gallons and greater with vapor pressures of 0.45 psia and greater</p>	<p>50 percent control OR alternative standard of venting to a control device continuously achieving a 20 ppmv outlet concentration OR 95 percent control OR alternative standard of venting to a control device continuously achieving a 20 ppmv outlet concentration</p>
Continuous Process Vents	HON TRE value calculations; two levels of control	<p>85 percent control for vents with TRE greater than 1.0 but less than or equal to 1.2 and 98 percent control for vents with TRE equal to or less than 1.0 OR alternative standard of venting to a control device continuously achieving a 20 ppmv outlet concentration</p>
Reactor Batch Process Vents	No applicability criteria, all reactor batch process vents are subject to control	<p>95 percent control over the batch cycle; or 0.01 kilogram of HAP per megagram of product; OR alternative standard of venting to a control device continuously achieving a 20 ppmv outlet concentration</p>

Table 8-1. PROPOSED STANDARDS FOR NEW AFFECTED SOURCES

Emission Point	Applicability Criteria	Standard
Non-Reactor Batch Process Vents	Facility-wide emissions from the collection of non-reactor batch process vents greater than or equal to 0.23 Mg	83 percent control for the collection of non-reactor batch process vents within the affected source; or alternative standard of venting to a control device continuously achieving a 20 ppmv outlet concentration
Heat Exchange Systems	No applicability criteria	Monitor for leaks
Wastewater	HON applicability criteria	HON control level
Equipment Leaks	HON applicability criteria <sup>a</sup>	HON leak detection and repair program

<sup>a</sup> The HON has an exemption for equipment components in organic HAP service less than 300 hours per year.

Table 8-2. PROPOSED STANDARDS FOR EXISTING AFFECTED SOURCES

Emission Point	Applicability Criteria	Standard
Storage Vessels	<p>for aqueous formaldehyde vessels; vessels with capacities of 10,000 gallons or greater with vapor pressures of 0.47 psia or greater</p> <p>for non-aqueous formaldehyde vessels; vessels with capacities of 10,160 gallons or greater with vapor pressures of 2.45 psia or greater <u>and</u> tanks with capacities of 90,000 gallons and greater with vapor pressures of 0.45 psia and greater</p>	<p>50 percent control</p> <p>OR</p> <p>alternative standard of venting to a control device continuously achieving a 20 ppmv outlet concentration</p>
Continuous Process Vents	Not applicable	No standard selected
Reactor Batch Process Vents	No applicability criteria, all reactor batch process vents are subject to control	<p>93 percent control over the batch cycle;</p> <p>OR</p> <p>0.017 kilogram of HAP per megagram of product; OR</p> <p>alternative standard of venting to a control device continuously achieving a 20 ppmv outlet concentration</p>
Non-Reactor Batch Process Vents	Facility-wide emissions from non-reactor batch process vents greater than or equal to 0.23 Mg	<p>68 percent control for all non-reactor batch process vents within the affected source;</p> <p>OR</p> <p>alternative standard of venting to a control device continuously achieving a 20 ppmv outlet concentration</p>
Heat Exchange Systems	No applicability criteria	Monitor for leaks
Wastewater	Not applicable	No standard selected

Table 8-2. PROPOSED STANDARDS FOR EXISTING AFFECTED SOURCES

Emission Point	Applicability Criteria	Standard
Equipment Leaks	HON applicability criteria <sup>a</sup>	HON leak detection and repair program

<sup>a</sup> The HON has an exemption for equipment components in organic HAP service less than 300 hours per year.

#### 8.6.1 Storage Vessels

The proposed standard for storage vessels at existing affected sources is 50 percent emission reduction for storage vessels meeting the following applicability criteria:

Aqueous formaldehyde       $\geq 10,000$  gallons capacity with vapor  
pressure  $\geq 0.47$  psia

Non-aqueous formaldehyde  $\geq 10,160$  gallons capacity with vapor  
pressure  $\geq 2.45$  psia; and  $\geq 90,000$   
gallons capacity with vapor  
pressure  $\geq 0.45$  psia

For storage vessels at new affected sources, the applicability criteria are the same but the control levels are different. For aqueous formaldehyde storage vessels, the control level is 50 percent, and for non-aqueous formaldehyde storage vessels, the control level is 95 percent.

#### 8.6.2 Continuous Process Vents

The proposed standard for continuous process vents at new affected sources utilizes the MACT floor level of control and the HON process vent provisions to establish a two-tiered standard. For continuous process vents with total resource effectiveness values (TRE) greater than 1.0 but less than equal to 1.2, 85 percent emission reduction is required (i.e., MACT floor). For continuous process vents with a TRE value of 1.0 or less, 98 percent emission reduction is required (i.e., HON). For process vents with a TRE value greater than 1.2, controls are not

required. TRE values are determined using the TRE equations from the HON for a thermal incinerator with 70 percent heat recovery. As an alternative to the percent reduction, an owner or operator may demonstrate that the selected controls reduce the outlet concentration to 20 ppmv.

The proposed rule does not contain any requirements for the control of continuous process vents at existing affected sources.

### 8.6.3 Batch Process Vents

Batch process vents are distinguished as reactor batch process vents or non-reactor batch process vents under the proposed standards, and are discussed separately in this section.

8.6.3.1 Reactor Batch Process Vents The proposed standards for reactor batch process vents at new affected sources are 95 percent emission reduction with an alternative emission limit of 0.01 kilogram of HAP per megagram of product. The proposed standards for reactor batch process vents at existing affected sources are 93 percent emission reduction with an alternative emission limit of 0.017 kilogram of HAP per megagram of product. Because there are no applicability criteria for reactor batch process vents, all vents require control.

8.6.3.2 Non-Reactor Batch Process Vents. The proposed standard for non-reactor batch process vents at new affected sources is an overall emissions reduction of 83 percent from all non-reactor batch process vents within the affected source for affected sources with emissions from non-reactor batch process

vents greater than or equal to 0.25 tpy. The proposed standard for existing affected sources is an overall emissions reduction of 68 percent for the collection of non-reactor batch process vents within the affected source for affected sources with emissions from the collection of non-reactor batch process vents greater than or equal to 0.23 Mg.

#### 8.6.4 Heat Exchange Systems

A monitoring program to detect leaks from the process into the cooling water is the proposed standard for heat exchange systems at both new and existing affected sources. This monitoring program is the same as the HON program (40 CFR part 63, subpart F).

#### 8.6.5 Wastewater Streams

The proposed standard for wastewater streams at new affected sources is the HON. No standard is being proposed for existing affected sources.

#### 8.6.6 Equipment Leaks

The proposed standard for equipment leaks at new and existing affected sources is based on the HON (40 CFR part 63, subpart H). Aspects of the proposed standards that are not found in the HON are: (1) the option to group valves, (2) longer monitoring frequencies for facilities that demonstrate lower leak frequencies for valves and connectors, (3) delay of repair of equipment for which leaks have been detected is also allowed if the owner or operator determines that repair personnel would be



exposed to an immediate danger if attempting to repair without a process shutdown, and (4) closed-vent systems designed to operate at a pressure below atmospheric pressure may be used to comply.

#### 8.6.7 Alternative Standard

As an alternative to the standards presented above for storage vessels, continuous process vents, reactor batch process vents, and non-reactor batch process vents, an owner or operator may choose to meet an alternative emission limit. Under the alternative emission limit, vent streams requiring control may be vented to a control device continuously achieving an outlet concentration of 20 ppmv of organic HAP. This alternative emission limit differs from the 20 ppmv alternatives that accompany the percent reduction requirements for storage vessels and continuous process vents in that a performance test specific to an individual emission point is not required. Instead, an initial demonstration that the control device continuously achieves an outlet concentration of 20 ppmv of organic HAP is required. Continuous compliance is demonstrated through continuous monitoring of the control device outlet concentration.

#### 8.6.8 Compliance and performance test provisions

Compliance and performance test provisions, to include group determination procedures, contained in the proposed rule are based on the HON, but there are several important exceptions. First, test methods are different because of the specific HAP emitted by amino/phenolic resin facilities. Second, the specific

provisions for batch process vents are based on the provisions from the promulgated Group IV Polymers and Resins NESHAP.

Because of the specific HAP emitted by amino/phenolic resin facilities, the test methods specified in the HON are not completely adequate for the proposed rule. Specifically, formaldehyde is not adequately detected using either Method 18 or Method 25A of appendix A, 40 CFR part 60. Therefore, the following test methods have been added specifically for formaldehyde: Methods 316 and 320. Method 316 is a manual method that was proposed with the Mineral Wool NESHAP and Method 320 is an FTIR-based method that was proposed with the Portland Cement NESHAP. Further, Method 18 does not always adequately detect methanol, and Method 308 has been included as an option for testing for methanol.

Under the proposed rule, control devices receiving 9.1 Mg/yr (10 tpy) or less of uncontrolled HAP emissions are not required to conduct a performance test and instead may perform a design evaluation to demonstrate compliance with the proposed rule.

Each type of emission point is discussed briefly in the paragraphs below.

#### 8.6.8.1 Storage Vessels

The proposed standards for storage vessels refer directly to the HON storage vessel provisions. The group status of storage vessels is determined based on the storage vessel capacity and vapor pressure of the stored material. The proposed rule

includes a table specifying storage vessels that are Group 1 and therefore require control. There is no requirement for an emissions test or engineering assessment to determine the group status of a storage vessel.

Compliance demonstration provisions include periodic visual inspections of vessels, roof seals, and fittings, as well as internal inspections.

#### 8.6.8.2 Continuous Process Vents

The proposed standards for continuous process vents refer directly to the HON process vent provisions. Under the referenced provisions, an owner or operator is required to either calculate a TRE index value to determine whether each continuous process vent is a Group 1 or Group 2 vent, or the owner or operator can elect to comply with the continuous process vent control requirements without calculating the TRE index. The TRE index value is determined after the last recovery device in the process or prior to venting to the atmosphere. The TRE calculation involves an emissions test or engineering assessment and use of the TRE equations in the proposed rule.

Performance test provisions are included for Group 1 continuous process vents to verify that the control device achieves the required performance.

#### 8.6.8.3 Batch Process Vents

There are no group determination procedures for reactor batch process vents because all reactor batch process vents are

subject to control under the proposed rule. For non-reactor batch process vents, control is required for affected sources with 0.25 tons per year of uncontrolled emissions from the collection of non-reactor batch process vents within the affected source. Procedures for determining uncontrolled emissions from non-reactor batch process vents are included in the proposed rule. For those affected sources required to control non-reactor batch process vents, an owner or operator can choose to not control some non-reactor batch process vents, as long as emissions from the collection of non-reactor batch process vents are reduced by the specified percentage. Performance test provisions are included to verify the efficiency achieved by the control device.

Compliance is demonstrated by showing that for the batch cycle, if an individual reactor batch process vent is being controlled, or on an overall basis, if non-reactor batch process vents are being controlled, the specified percent reduction is achieved. To demonstrate this, an emissions profile must be developed that identifies each batch emission episode included in the batch process vent and characterizes emissions from each batch emission episode on a mass emitted per unit time basis. Using this emissions profile, the owner or operator must show that the periods of under-control and over-control of emissions balance and the batch cycle percent reduction or the overall percent reduction is achieved. The proposed rule contains

procedures for estimating emissions from individual batch emission episodes, estimating control device efficiency, and for demonstrating that the required percent reduction is achieved.

Procedures for demonstrating compliance with the alternative kilogram of HAP per megagram of product emission limit are also included in the proposed rule.

#### 8.6.8.4 Heat Exchange Systems

There are no performance test requirements for heat exchange systems. Compliance is demonstrated through the monitoring of cooling water to detect leaks in heat exchange systems. If a leak is detected, the heat exchange system must be repaired.

#### 8.6.8.5 Wastewater

The proposed standards for wastewater refer directly to the HON wastewater provisions. For demonstrating compliance with the various requirements (i.e., group determinations, demonstrations of control device performance, or demonstrations of treatment processes), the proposed rule allows the owners or operators to either conduct performance tests or to document compliance using engineering calculations.

#### 8.6.8.6 Equipment Leaks

The proposed standards for equipment leaks refer directly to the HON equipment leak provisions. The proposed rule retains the use of Method 21 to detect leaks. Method 21 requires a portable organic vapor analyzer to monitor for leaks from equipment in use. A "leak" is a concentration specified in the regulation for the type of equipment being monitored and is based on the instrument response to methane (the calibration gas) in air. The observed screening value may require adjustment for response factor relative to methane if the weighted response factor of the stream exceeds a specified multiplier. The proposed rule requires the use of Method 18 to determine the organic content of a process stream.

#### 8.6.9 Monitoring Requirements

Continuous parameter monitoring is required for control devices. Exceptions to this are that control devices controlling less than 1 ton per year of uncontrolled emissions are exempt from continuous monitoring but must conduct a daily or per batch demonstration that the control device is operating properly. Second, control devices serving storage vessels are not required to conduct parameter monitoring unless the owner or operator specifies continuous monitoring in the monitoring plan required by the referenced HON provisions. However, if a control device is used, the owners or operator must identify the appropriate monitoring procedures to be followed for compliance demonstration

purposes. Further, if a control device serves both a storage vessel(s) and another emission point subject to the proposed rule, the control device is subject to continuous parameter monitoring if the other emission point is subject to continuous parameter monitoring.

Parameters must be monitored when emissions are vented to the control device. The proposed rule directly references the HON monitoring requirements for continuous process vents, storage vessels, and wastewater. However, there are general monitoring requirements specified in the proposed rule (e.g., establishment of parameter monitoring levels) that apply to all emission points.

The proposed rule identifies parameters to be monitored for most control devices expected to be used for emission points regulated by the proposed rule. Parameter monitoring levels are established based on design evaluation for control devices with uncontrolled emissions less than 10 tons per year. For all other control devices required to conduct continuous parameter monitoring, parameter monitoring levels are established based on a performance test, but can be supplemented by manufacturer's recommendations and/or an engineering assessment. If an owner or operator chooses to supplement results of the performance test using manufacturer's recommendations and/or engineering assessment, the established parameter monitoring level is subject to review and approval by the Administrator.

Parameter monitoring averages are determined based on all recorded values, except for values recorded under certain conditions, for example under conditions of start-up, shutdown, or malfunction. Parameter averages must be daily averages for control devices serving continuous process vents, waste management units, storage vessels (if required), or equipment leaks. Parameter averages may be either batch cycle daily averages or block averages for batch process vents. Parameter averages based on batch cycle daily averages cover a 24-hour period, based on the defined operating day, and may or may not cover multiple batch cycles for the batch process vent. A batch cycle daily average may also cover partial batch cycles, therefore the proposed rule requires that the information required to calculate parameter monitoring compliance for partial batch cycles be provided. Parameter averages based on block averages cover the complete batch cycle, regardless of the length of time for the batch cycle.

There are two types of violations under the proposed rule; violations of the operating limit and violations of the emission limit. Violations of the operating limit occur when not enough monitoring data are available to constitute a valid days worth of data or when the average is above the maximum or below the minimum established value. The proposed rule requires that 75 percent of the possible data points are recorded and are valid during a day. Violations of the emission limit occur when



parameter monitoring values that directly reflect the control device performance, such as condenser outlet temperature or the use of an organic monitoring device, are above the maximum or below the minimum established value. Other violations of the emission limit occur when a control device fails to meet the 20 ppmv alternative standard allowed for continuous process vents, batch process vents, and storage vessels, or when a control device fails to meet the kilogram of HAP per megagram of product emission limits for batch process vents.

Provisions for alternate monitoring parameters are included in the proposed rule. An owner or operator must apply for approval to monitor an alternate parameter.

#### 8.6.10 Recordkeeping and Reporting Requirements

The general recordkeeping and reporting requirements of this subpart are very similar to those found in the HON. The proposed rule also relies on the provisions of subpart A of 40 CFR part 63. A table included in the proposed rule designates which sections of subpart A apply to the proposed rule. Specific recordkeeping and reporting requirements for each type of emission point are also included in the proposed rule. The proposed rule references the recordkeeping and reporting requirements for continuous process vents, storage vessels, wastewater, and equipment leaks.

The proposed rule requires sources to keep records and submit reports of information necessary to document compliance.

Records must be kept for 5 years. The following reports must be submitted to the Administrator as appropriate: (1) Precompliance Report, (2) Notification of Compliance Status, (3) Periodic Reports, and (4) Other Reports. The requirements for each of the four reports are summarized below. In addition, sources complying with the equipment leak requirements contained in subpart H must follow the recordkeeping and reporting requirements of subpart H.

8.6.10.1 Precompliance Report The Precompliance Report would be due no later than 12 months prior to the compliance date. The Precompliance Report includes the following, as appropriate: compliance extension requests; requests to monitor alternative parameters; intent to use alternative controls; intent to use the alternative continuous monitoring and recordkeeping allowed by the rule; demonstration that the emissions estimation equations for batch process vents are not appropriate; and information related to establishing parameter monitoring levels, if required.

8.6.10.2 Notification of Compliance Status

The Notification of Compliance Status would be due 150 days after the affected source's compliance date. It includes the information necessary to demonstrate that compliance has been achieved for emission points required to apply controls by the proposed rule. Such information includes, but is not limited to, the results of any performance tests; one complete test report

for each test method used for a particular kind of emission point; TRE determinations for continuous process vents; design analyses for storage vessels and wastewater emission points and for certain batch process vents; and monitored parameter levels for each emission point and supporting data for the designated level.

#### 8.6.10.3 Periodic Reports

Generally, Periodic Reports would be submitted semiannually. However, there is an exception. The Administrator may request that the owner or operator submit quarterly reports for certain emission points that the Administrator identifies. After 1 year, semiannual reporting can be resumed, unless the Administrator requests continuation of quarterly reports.

Periodic Reports would include information required to be reported under the recordkeeping and reporting provisions for each emission point. For continuously monitored parameters, the data on those periods when the parameters are above the maximum or below the minimum established levels are included in the reports. Periodic Reports would also include results of any performance tests conducted during the reporting period and instances when required inspections revealed problems.

#### 8.6.10.4 Other Reports

Other reports required under the proposed rule include: the notification of inspections required for storage vessels; reports of changes to the primary product for an APPU or process unit;

reports of addition of one or more APPUs, addition of one or more emission points, or change in the group status of emission points.